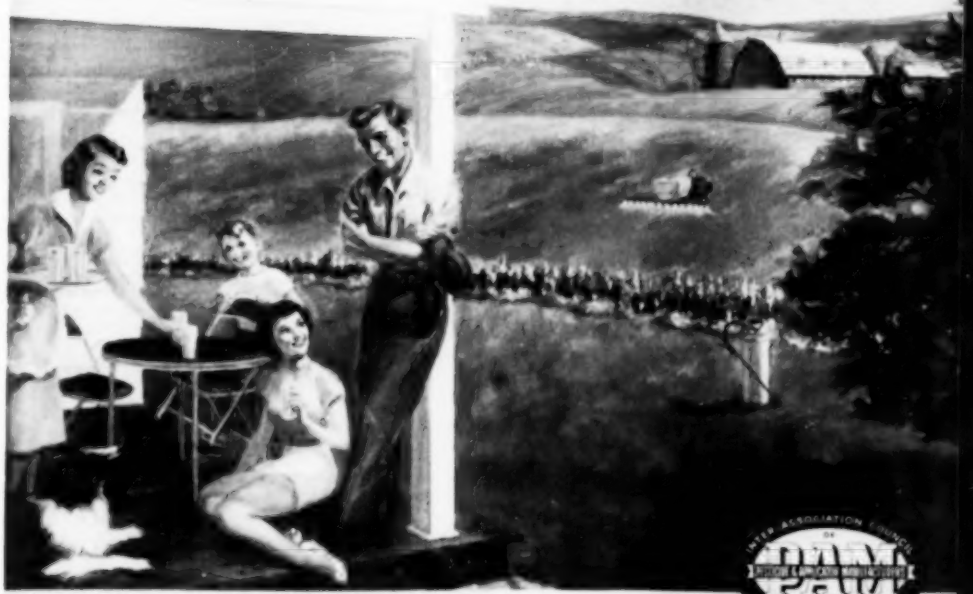
Vol. 9, No. 3 MARCH, 1954

AGRICULTURAL CHEMICALS

In This Issue:

Systemic Insecticide Studies
•
Livestock Pest Control
•
N.A.C. Meets in Houston
•
Soluble Fertilizers
•
DDT Residues on Corn
•
Canadian Assn. Meets
•
Fungicide Test Summaries
•
Alabama Pest Control Conf.
•
MidWest Shade Tree Conf.
•
Soil Improvement Meeting
•
Western Spray Conference
•
Small Package Market Survey
•
Insect Control Conference

IT PAYS TO SPRAY AND DUST for Health-Comfort-Profit



Use the right CHEMICAL in the right EQUIPMENT at the right TIME

1954 FAM Published by INTER ASSOCIATION COUNCIL OF PESTICIDE & APPLICATOR MANUFACTURERS, CHICAGO, ILLINOIS

Effective protection of cotton crops from sprout to bale means more cotton per acre.

Powco Brand Insecticide Concentrates give that essential protection through their fast killing power, trouble-free formulation and consistent top quality.

Powell offers a complete line of cotton insecticides . . . ***DDT . . . TEPP . . . BHC . . . TOXAPHENE . . . ALDRIN . . . DIELDRIN . . . HEPTACHLOR.***

All these materials – whether liquid, dust or wettable powders – are designed for ease and economy in your formulations.

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KILLING POWER—THAT'S THE THING!

DDT · TOXAPHENE · BHC · CHLORDANE
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DILAN · HEPTACHLOR · 2, 4-D & 2, 4, 5-T.

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Sales Offices: Philadelphia · Pittsburgh · Chicago · Fort Worth · Omaha · San Francisco · Atlanta

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LOOK TO POWELL...FOR CONSISTENT, TROUBLE-FREE QUALITY

Row Crops to Cover Crops

The change in our farm production in recent years, from row crops to cover crops, has been a startling one.

A major contributing factor to this change has been the greatly increased usage of high-grade Muriate of Potash.

As the largest producer of potash in the industry, Potash Company of America is glad to participate in this progressive step.

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Carlsbad, New Mexico

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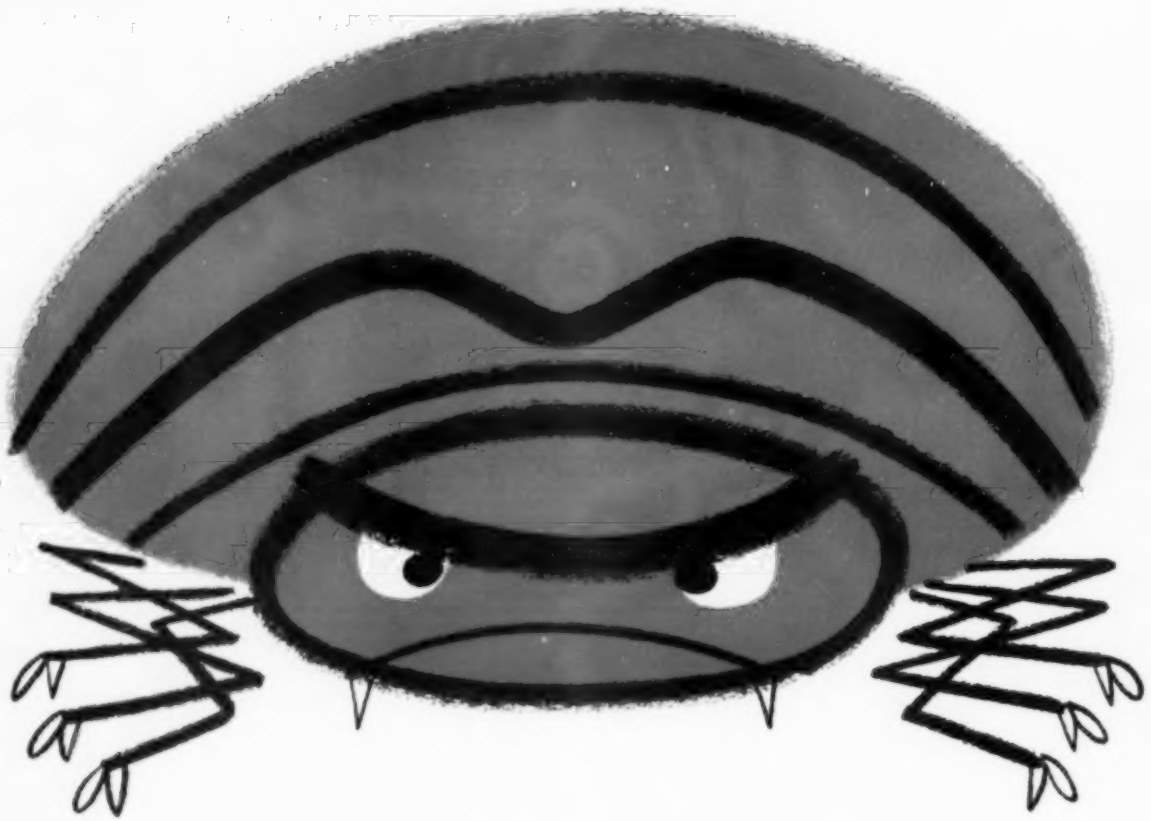

He hasn't a good word to say for Attaclay

Carriers for soil pesticides

We are leaders in developing granular grades for soil pesticides, herbicides and fungicides. Write for samples and for your copy of our latest report on this promising field.

What's bothering this aphid? Perhaps it was the helping of Attaclay-formulated pesticide dust he just consumed. Oh well, if *he* hasn't a good word to say for Attaclay, *you* will have!

Why? Because Attaclay is the carrier and diluent that helps you lick stickiness . . . heaviness . . . lumpiness—three troublemakers for the manufacturers (and users) of dust bases, wettable powders and finished dusts.

Primary Processors like the great fluidity of Attaclay, as received. Its extra-high sorptivity eases grinding operations—makes it a "natural" for liquid impregnation—keeps dusts on the move through materials handling equipment—delivers dry, free-flowing, premium-grade products.

Blenders start off ahead of the game if they use flowable Attaclay-formulated dust bases . . . and stay ahead by using Attaclay as diluent or conditioner.

Growers are pleased at the way Attaclay-based powders disperse and suspend in spray tanks; the way dusts flow, disperse, settle, cover, stick and kill.

For *maximum flowability* from formulation to field—specify Attaclay.

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ATTAPULGUS MINERALS & CHEMICALS CORPORATION

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AGRICULTURAL CHEMICALS

A Monthly Magazine For the Trade

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This Month's Cover

The new poster issued by PAM — the Inter-Association Council of Pesticide and Applicator Manufacturers — in its nationwide program to help dealers increase sales. The program is to be a continuing one, and new publicity will be issued throughout 1954. The poster and a dealer booklet are available through members of the Council.

MARCH 1954
Vol. 9 No. 3

In This Issue:

Accenting the Positive 31
By Lea S. Hitchner
Radiotracers In Study of Systemic Insecticides 33
By R. L. Metcalf
Modern Fertilizer Plant In Edison, California 36
Livestock Pest Control 40
By Ray Cuff
N.A.C.A. Meets In Houston 42
Home Garden Market—Part II 44
Water Soluble Plant Food Formulations 47
By Peter Garvan and David T. Mowry
Studies of DDT Residues on Corn Plants 50
By Jack E. Fahey, T. A. Brindley and H. W. Rusk
Canadian Agricultural Chemicals Conference 54
Results of 1953 Fungicide Tests, Conclusion 57
The Listening Post 79
By Kelvin Dorward and Paul R. Miller
Alabama Polytechnic Pest Control Conference 82B
Washington Report 82D
By Donald G. Lerch
Industry News 85
Industry Meeting Calendar 86
Technical Section 111
Suppliers Bulletins 119
Classified Advertising 157
Advertisers' Index 161
Tale Ends 162

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Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

DUK-PAK Kraft Bags

shed water resist abrasion and stay cleaner!

and A&S Duk-Pak Kraft bags cost no more than *ordinary* multiwall bags!

Yes, Arkell & Smiths' extensive tests prove that DUK-PAK has greater resistance to exposure, moisture and to weather — like the proverbial you-know-what! What's more, DUK-PAK has a special, "built-in" reinforced quality which makes it resistant to scuffing and abrasion. Where ordinary multiwall bags might "give-way" under rough handling, DUK-PAK holds its own, longer. This adds up to:

1. DUK-PAK provides dependable packaging for products that don't like water, moisture, or dirt, and

2. DUK-PAK protects your brand name and advertising which appear on the package.

Let Arkell & Smiths' 95 years of packaging "know how" serve you! Our Packaging Team — specialists in every phase of the operation — are prepared to tackle your specific problem. Address your inquiry to our Packaging Engineering Department at Canajoharie, N. Y.

ARKELL and SMITHS the oldest name in paper bags

ARKELL and SMITHS

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Use **Tennessee's SUL-FON-ATE AA 9** and reduce curing time. Increase turnover and tonnage while maintaining top quality.

Use **Tennessee's SUPER ACID** for fast Superphosphate curing.

Technical service is available to help you with your problems.

ORGANIC CHEMICALS DIVISION

TENNESSEE CORPORATION

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aldrin

and

dieldrin

...control many insects
...protect dozens of crops

You make more sales!

aldrin

Aldrin's fast action against major crop pests protects farm production, and its economical usage has meant aldrin's widespread adoption for many crops.

COTTON INSECTS

From the very start, aldrin has been a top favorite for all-season cotton insect control. It is famous for weevil kill, gets most of the other major cotton pests as well, and combined with DDT it knocks out bollworm.

SOIL INSECTS

Aldrin has established an outstanding record of soil insect control. On potatoes, alone, countless bushels have been saved from destruction by wireworms, tuber flea beetle larvae and cutworms.

And aldrin controls many other pests that destroy plants beneath or near soil level.

rootworms in corn
white grubs in turf and many field crops
lawn chinch bugs in turf and lawns
green June beetle larvae and
European chafer grubs in lawns and turf
sugar beet maggots in beets
Japanese beetle larvae in lawns and turf
ants on crops and turf

GRASSHOPPERS

Ever since its first appearance, aldrin has been the international "hopper stopper." Whether halting the attacks of these voracious crop-eaters in North America or ending the famines caused by its cousin, the desert locust, in the Middle East, nothing approaches the incredible 99% control of just *ounces* of aldrin *per acre*.

dieldrin

Dieldrin leads the parade of those organic insecticides which have long residual action. And it controls a wide variety of insects. For that reason, dieldrin is a fine stock item to meet the needs of growers *the year round*. Here are a few examples of dieldrin's versatility:

COTTON INSECTS

Dieldrin first attracted national attention in cotton growing areas. You can rely on it to stop boll weevil, thrips, cutworms and plant bugs. For bollworm, use a dieldrin-DDT mix.

PUBLIC HEALTH PESTS

Many communities are enjoying greater comfort and increased property values through dieldrin's control of houseflies, mosquitoes, fleas and ticks.

TURF INSECTS

One of the fastest growing markets for insecticides is their application to lawns, golf courses and park areas. Dieldrin is outstanding in the control of ants, Japanese beetle larvae, white grubs and chinch bugs.

Both aldrin and dieldrin are easily made into dusts, wettable powders, emulsible concentrates, and granules—all common formulations. Your sales of these insecticides are backed by State and Federal recommendations, the finest of technical service, and a comprehensive advertising campaign. Sell them confidently!

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AGRICULTURAL CHEMICALS DIVISION

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OPEN MOUTH PASTED BOTTOM

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Brilliant multi-color printing of your brands on Hammond Multi-Walls . . . combined with the uniform high quality of papers and materials used in their production, provide you with shipping containers second to none. Manufactured to exacting standards every step of the way, Hammond Multi-Walls are attractive and strong for safe, economical delivery of your products. Consult your Hammond man today.

For Multi-Wall bags, "make it a habit to depend on Hammond."

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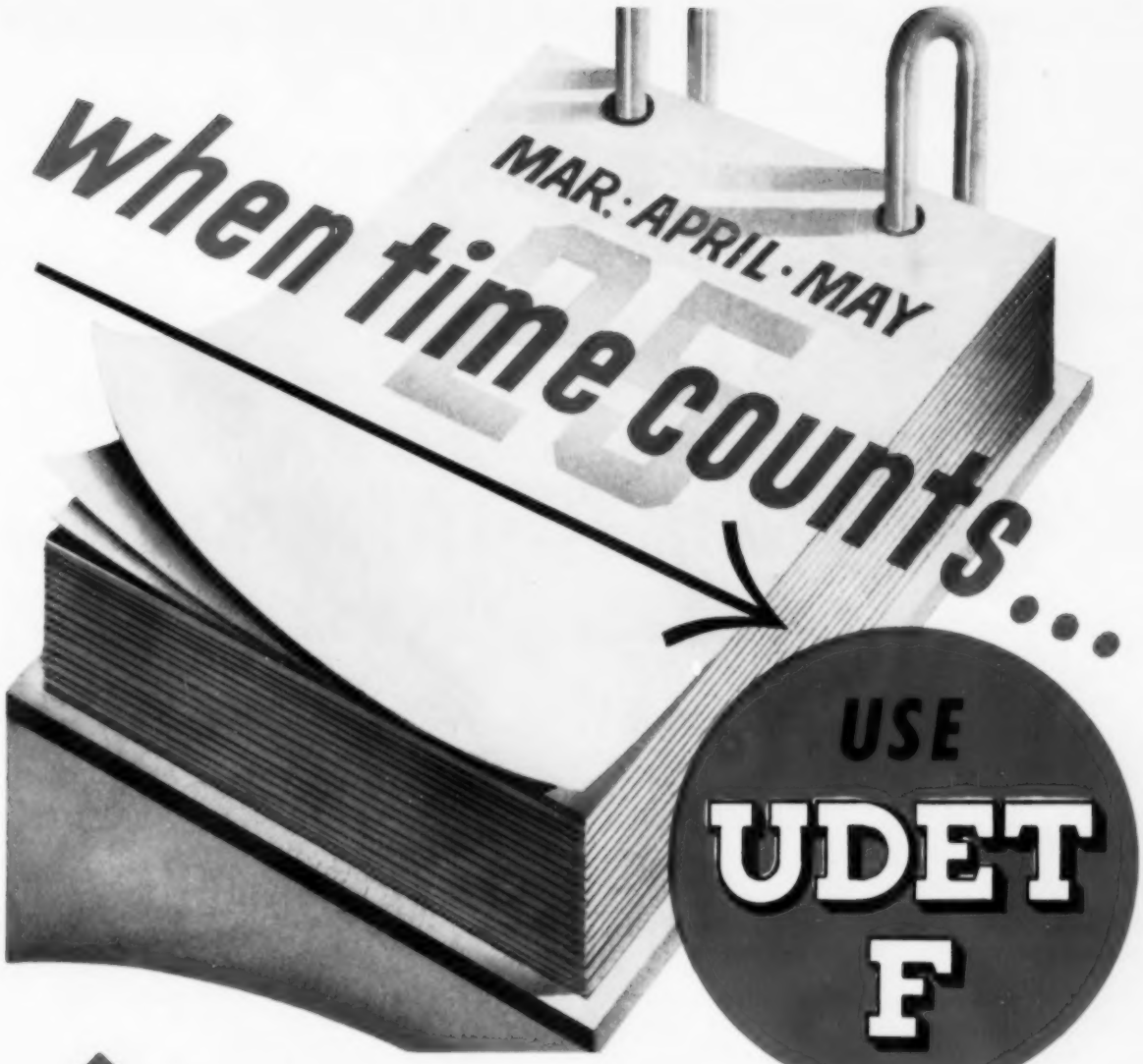

Now, this Spring, when peak production is your goal, use UDET F and get: Faster curing. Easier handling of materials. Faster milling and screening. Minimum "down" time.

Maintain maximum production. And deliver a fully-cured product, practically free from caking, for continued customer satisfaction.

Use UDET F, the *one* surfactant *proved* by fertilizer makers in conclusive tests!

UDET 95F — a 95% active granular powder
UDET 50F — a 50% active free-flowing liquid

IN ACIDULATION, UDET F is up to 3-times more effective than competing products in the presence of calcium ions.

IN AMMONIATION, UDET F, being instantly soluble, disperses completely in the mix. Permits higher absorption of ammonia.

IN GRANULATION, UDET F inhibits cake build-up and equipment fouling. Increases production through less "down" time.

IN AMMONIUM SULFATE PRODUCTION, UDET F lowers moisture content. Provides anti-caking properties.

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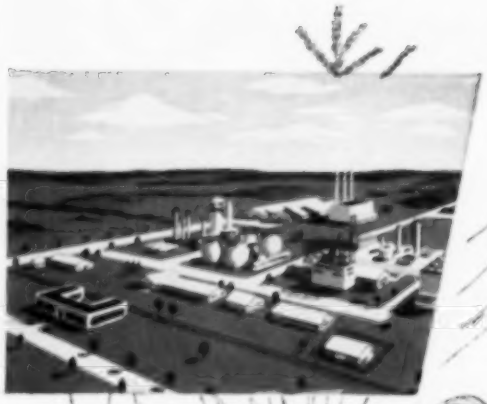

from this growing 'plant'

... A RICH HARVEST FOR AMERICA

This young plant is growing fast. It will begin to bear fruit this fall. And the nation's industry and agriculture will reap the harvest — a harvest of high quality nitrogen products that will contribute to increased comfort and convenience for us all.

This new plant, located in Memphis, Tennessee, is designed to produce 72,000 tons of nitrogen annually, in the form of urea and anhydrous ammonia. It represents a reliable new source for these important chemicals.

Already, urea and ammonia occupy strategic positions in American industrial production — for both civilian consumption and defense. Advancing technology will increase the demands upon the nation's supplies as new fibers, resins, petroleum derivatives, propellants and pharmaceuticals are created. In agriculture, too, more and more urea and ammonia will be needed each year to raise the capacity of our soils for sustained high-level crop production.

Watch this plant grow — and be ready to reap *your* share of the harvest. A free 20-page booklet "Introducing Grace Chemical Company" tells the story in detail. Write for your copy.

A WORLD OF EXPERIENCE

GRACE CHEMICAL COMPANY

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Announcing An Important New Agricultural Chemical!

GENERAL CHEMICAL'S "STA-FRESH*" Sodium Bisulfite

THE BEST YET FOR KEEPING GRASS SILAGE FRESH, GREEN AND SWEET SMELLING

"STA-FRESH" is General Chemical's remarkable new Silage Grade Sodium Bisulfite that keeps grass silage fresh, bright green and sweet smelling. Now—after two years of excellent results in extensive "on the farm" tests, General Chemical is making this easy-to-use, low-cost powder available to dairymen and livestock raisers everywhere.

Offers Many Advantages

Because of the many advantages of Sodium Bisulfite, county agents and experiment stations are already advising farmers to use "Sta-Fresh" in making silage this spring. When "Sta-Fresh" is used, crops can be cut at maturity regardless of weather. Carotene and sugar contents are much higher in bisulfite-treated silage. So are digestible dry matter and total digestible nutrients. Spoilage is reduced and there is none of the customary silage "stink" to cling to clothes, contaminate the barn and taint the milk.

Cattle Prefer "Sta-Fresh" Treated Silage

Cows prefer the natural green color and fresh grass odor of bisulfited silage. In a typical free-choice feeding test, cattle ate an average 63 pounds of bisulfite silage compared to only 18 pounds of ordinary, untreated silage.

Economical—Easy-to-Use

At rates varying from 8 to 10 pounds per ton, "STA-FRESH" has been used successfully on a variety of forage crops, including alfafa, brome grass, orchard grass, ladino clover, sweet clover, timothy, vetch, oats and corn. "STA-FRESH" is easy to use—the powder is added as the crop is blown into the silo.

Write for Free Information Bulletin

"STA-FRESH" insures the farmer a more palatable silage with higher food value . . . it takes less work and costs less to prepare. From its vantage point of over fifty years as a producer of Orchard Brand agricultural chemicals, General Chemical believes that "STA-FRESH" is an outstanding contribution to the grass farming program.

Now available for prompt delivery in 100-lb. paper bags. Write for name of nearest dealer.

*General Chemical Trade Mark

GC Allied Chemical

Agricultural Chemical Department

GENERAL CHEMICAL DIVISION

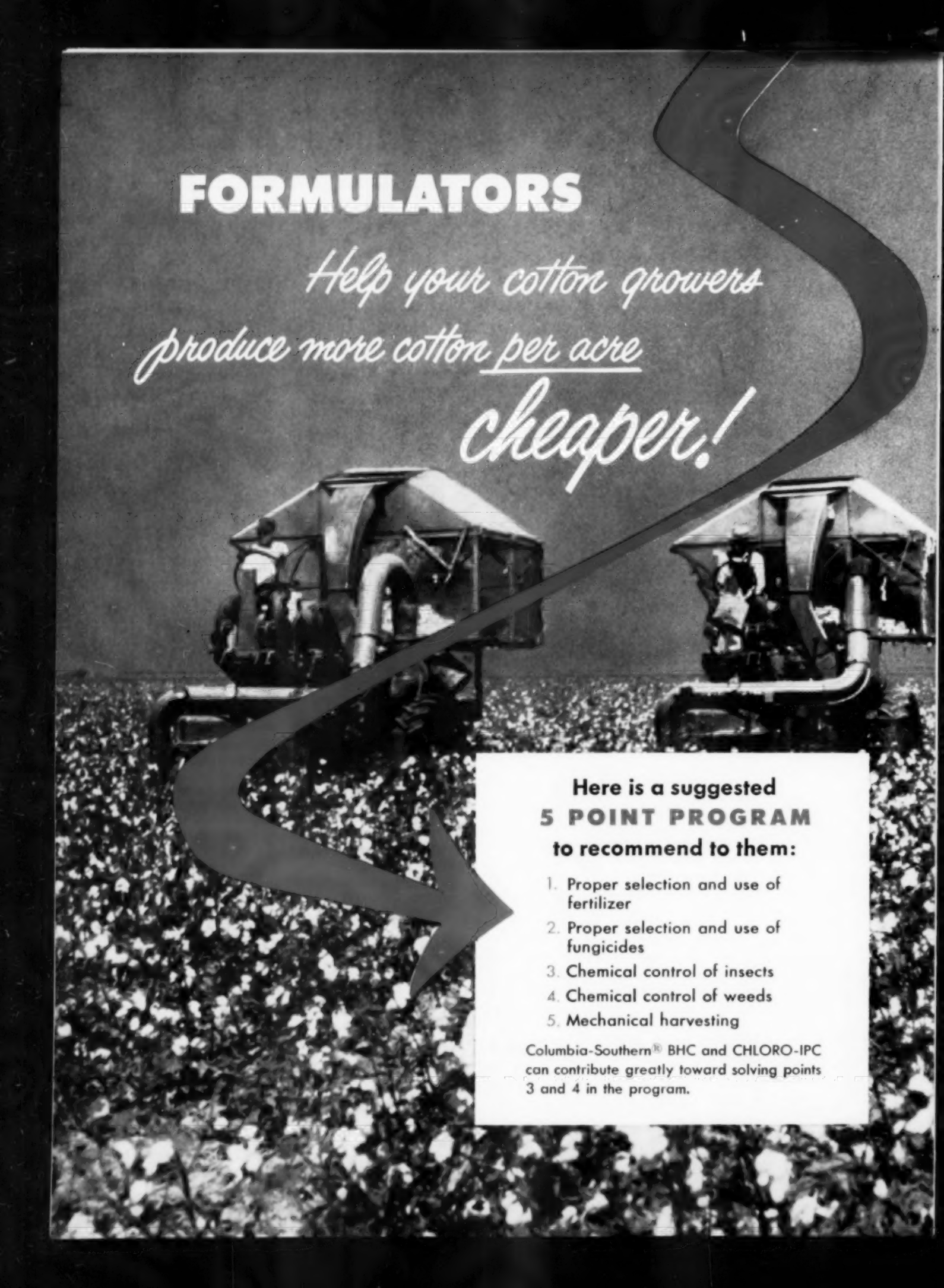
ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Serving Agriculture from Coast to Coast

FORMULATORS

Help your cotton growers produce more cotton per acre cheaper!



Here is a suggested
5 POINT PROGRAM
to recommend to them:

1. Proper selection and use of fertilizer
2. Proper selection and use of fungicides
3. Chemical control of insects
4. Chemical control of weeds
5. Mechanical harvesting

Columbia-Southern® BHC and CHLORO-IPC can contribute greatly toward solving points 3 and 4 in the program.

BHC INSECTICIDE

Benzene Hexachloride

Three carloads of Columbia-Southern BHC, when mixed with other ingredients, make 15 carloads of BHC cotton dust. This quantity is sufficient to treat 12,000 acres of cotton plants, or 20 square miles, against the ravages of the boll weevil.

The average yield per acre of cotton is 250 pounds. However, even when the yield is as much as 700 pounds per acre, proper insect control through the use of BHC has been known to increase this to 1200 pounds per acre.

BHC dust costs $10 or less per acre to apply, yet the grower can realize approximately $100 in return.

Encourage your growers to use BHC for more cotton per acre-cheaper!

CHLORO-IPC HERBICIDE

Isopropyl N (3-Chlorophenyl) Carbamate

Chloro-IPC, pioneered by Columbia-Southern, represents one of the greatest agricultural advancements in the last 20 years. When sprayed on the ground simultaneously with the planting of the cotton seed, Chloro-IPC controls weeds before they emerge. Hoeing costs are reduced up to 90%. Cotton plants are bigger and stronger and produce maximum yield.

In Louisiana, a grower of 400 acres of cotton reports that Chloro-IPC treated cotton costs him only $1.18 an acre to hoe as compared with $15 to manually hoe an untreated acre.

Chloro-IPC has proved itself so effective that one Southern banker is willing to loan $2 more per acre if the farmer will use Chloro-IPC in his cotton plantings.

Encourage your growers to use CHLORO-IPC for more cotton per acre-cheaper!

For further information on BHC or CHLORO-IPC contact your nearest Columbia-Southern Office

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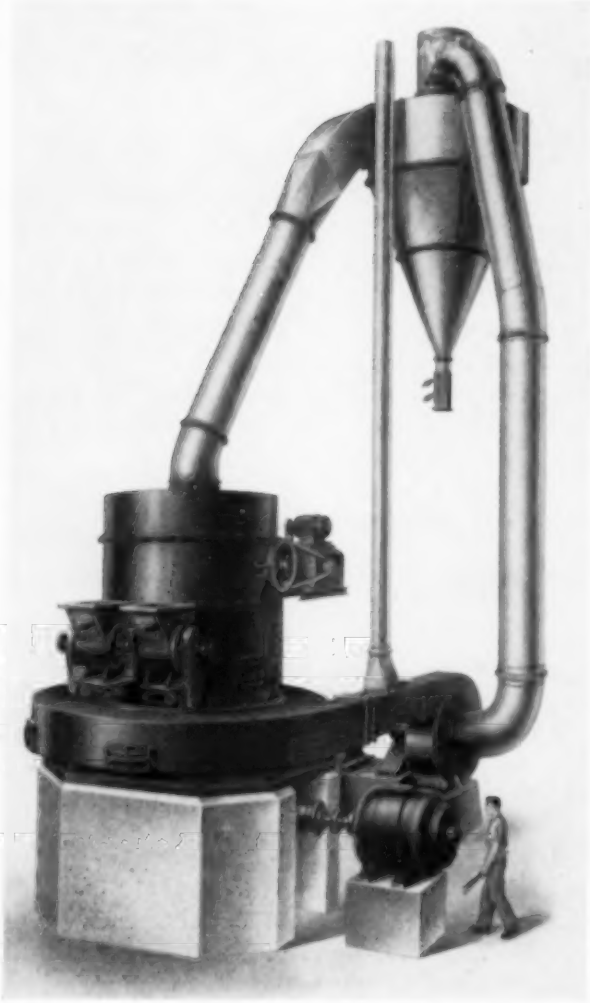
RAYMOND SUPER ROLLER MILL



For Extra Large Production

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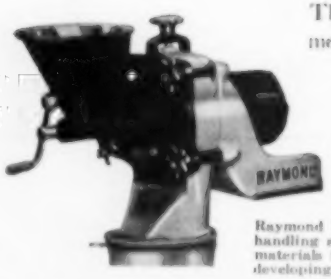
Automatic Control and Dust-Free Operation

Setting New Low Cost in PHOSPHATE ROCK GRINDING

RAYMOND Roller Mills have earned a reputation for economy in phosphate rock grinding, and there are more than 200 installations handling all types of phosphate deposits for producing finely ground material both for acidulation and direct application.

They are built in a range of sizes to meet capacity requirements of small and large plants up to thirty tons or more per hour. The Super Roller Mill offers important savings for large output. It conserves space, centralizes operations, simplifies material handling and insures uniformity of product.

It is equally efficient in pulverizing agricultural limestone, chemicals and many non-metallic minerals.



Raymond Laboratory Mill for handling small batches of soft materials for test runs, and in developing new products.

For further details, ask for Raymond Catalog No. 69.

COMBUSTION ENGINEERING, INC.

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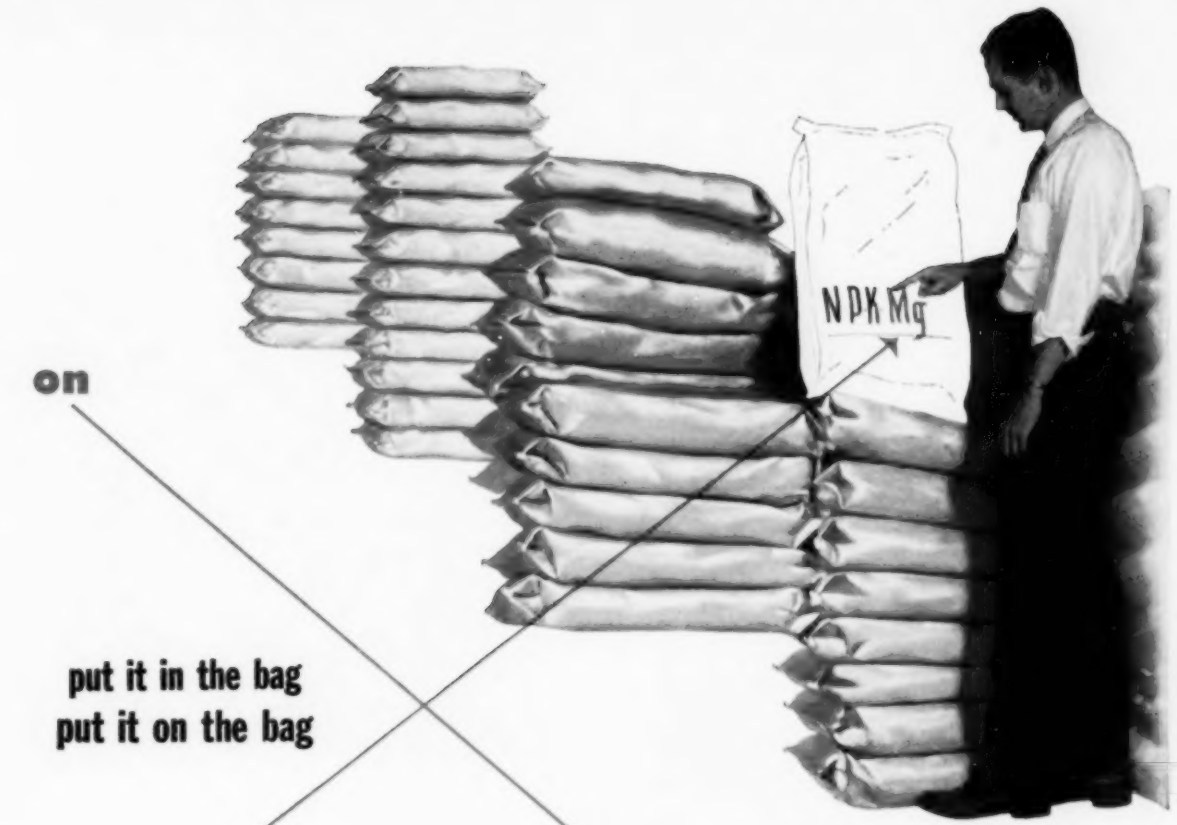

on

put it in the bag
put it on the bag

in

Sul-Po-Mag®

WATER-SOLUBLE ($K_2SO_4 \cdot 2MgSO_4$)
DOUBLE SULFATE OF POTASH-MAGNESIA

CONTAINS SOLUBLE MAGNESIUM

THE FOURTH ELEMENT

Your dealers will sell your fertilizers with greater confidence and enthusiasm and effectiveness when you use *water-soluble magnesium*, the fourth element in the fertilizer bag.

That's mighty important in this year's highly competitive market. With the fourth element added, your fertilizer contains the four primary plant food nutrients needed for healthy plant growth; it has greater sales appeal, more value for the farmer.

Fertilizer manufacturers from coast to coast are using *Sul-Po-Mag* regularly because they know that farmers are getting finer quality, more profitable crops grown on magnesium deficient soils when they use fertilizers containing water-soluble magnesium.

Sul-Po-Mag is a properly balanced combination of *sulfate of magnesium* and *sulfate of potash*. Both are water-soluble and immediately available to growing crops. *Sul-Po-Mag* is the most economical and practical way to supply water-soluble magnesium in mixed fertilizer. So put it *in* the bag and put it *on* the bag: Nitrogen, Phosphate, Potash, *Magnesium*.

MURIATE OF POTASH • SULFATE OF POTASH • SUL-PO-MAG

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26% NITROGEN

supplies the 2 key forms of nitrogen

Contains 6½% nitrate nitrogen — quick acting for early, vigorous growth. Contains 19½% ammonia nitrogen — slower acting for sustained growth through to harvest time.

easy to use

Pelletized and properly sized for flow. Easy to handle, ready to use for top dressing, side dressing and irrigation.

now available

F.O.B. all regular Atlantic and Gulf ports, shipped to the trade in even-weight bags. Write us today for a sample and further information.

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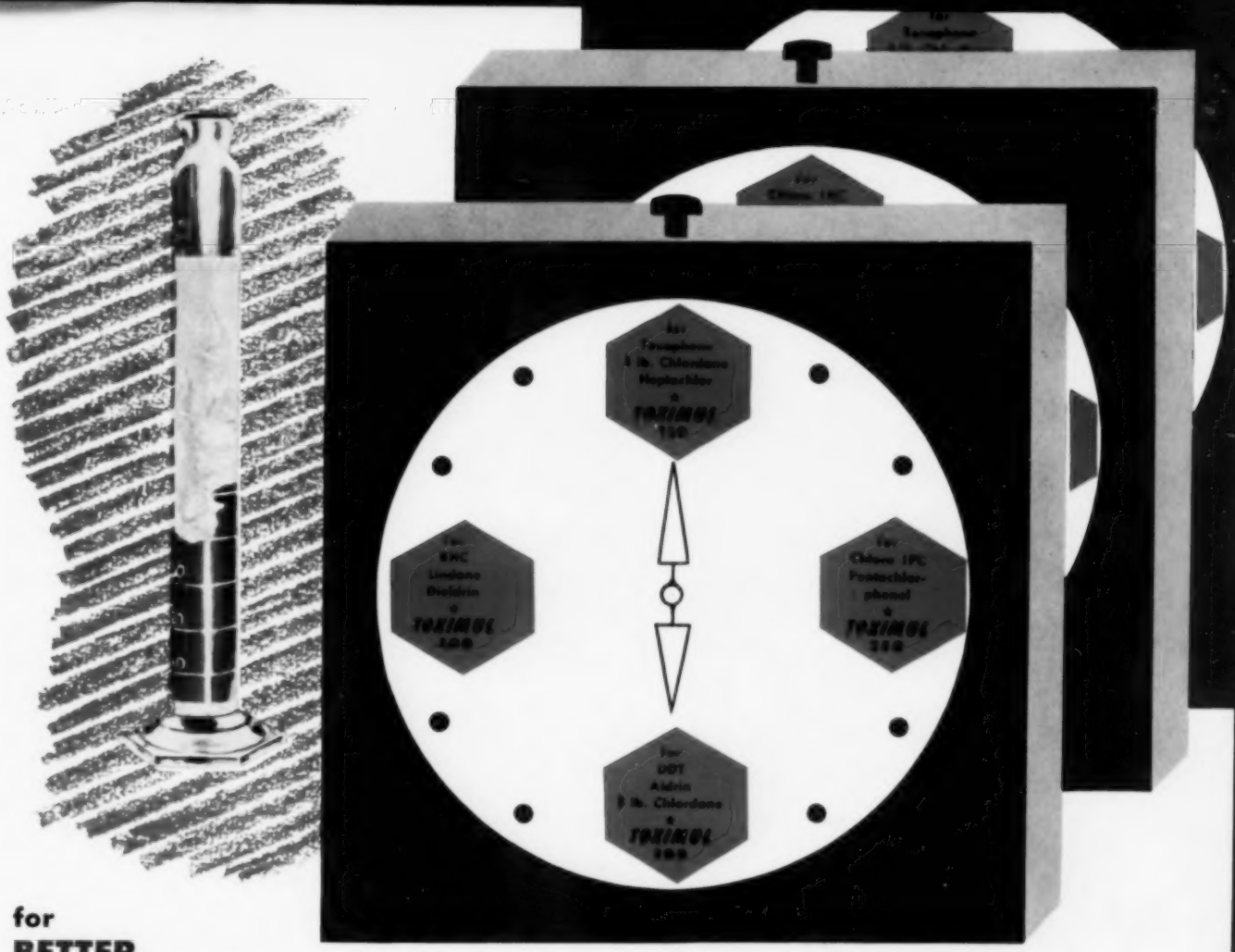

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BETTER FORMULATIONS
it's always

Time for TOXIMUL!

There's no time like the present to take advantage of the TOXIMULS, if you want formulations of the highest quality at the lowest cost! These Ninol-developed anionic-nonionic blends give you new highs in *flash dispersibility* and *emulsion stability* in all waters.

For plants all over the country, these features of the versatile and efficient TOXIMULS have meant better production, more satisfied users of their products — yet with an actual saving on costs!

It will pay you to investigate the TOXIMUL Blended Emulsifiers — there's one especially suited to *your* formulation, unless you have a very unusual problem. And if you do, we will be happy to develop a special TOXIMUL to fit it. Write today for samples and bulletins.

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Detergents —
— Emulsifiers

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Please send working samples and Technical Bulletins describing:

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- ☐ *TOXIMUL* 300 (for use with DDT, Aldrin, 8 lb. Chlordane)
- ☐ *TOXIMUL* 400 (for use with BHC, Lindane, Dieldrin
- ☐ *TOXIMULS* (for use with other pesticides)

Signed _____

Co. _____

Street _____

City & State _____

Want a Greater Alfalfa Yield per acre?

BORON-HUNGRY ALFALFA...Dwarfed and puny, with yellow or reddened top leaves, stunted, with growing tips rosetted. When these symptoms appear, it's Nature's distress signal for a new supply of Boron.

TOP QUALITY ALFALFA...Fertilized with Boron, grows lush and strong...provides maximum yield with bigger profits. Vigorous growth, such as this, shades out weeds resulting in longer life stands.

Borated Fertilizers pay 3 ways on Alfalfa

1. **EXTRA YIELDS**—an extra ton of hay per acre.
2. **BETTER QUALITY**—hay that is extra-leafy and green.
3. **LONGER LIFE STANDS**—vigorous growth shades out weeds.

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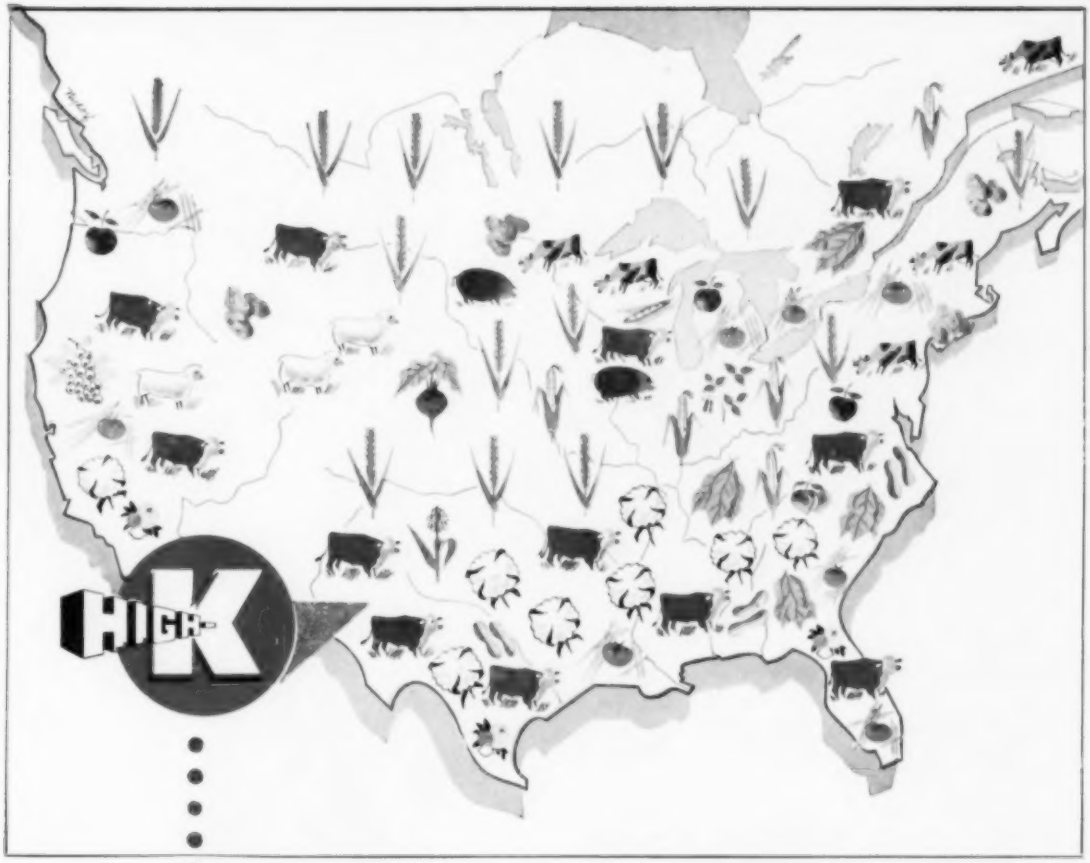

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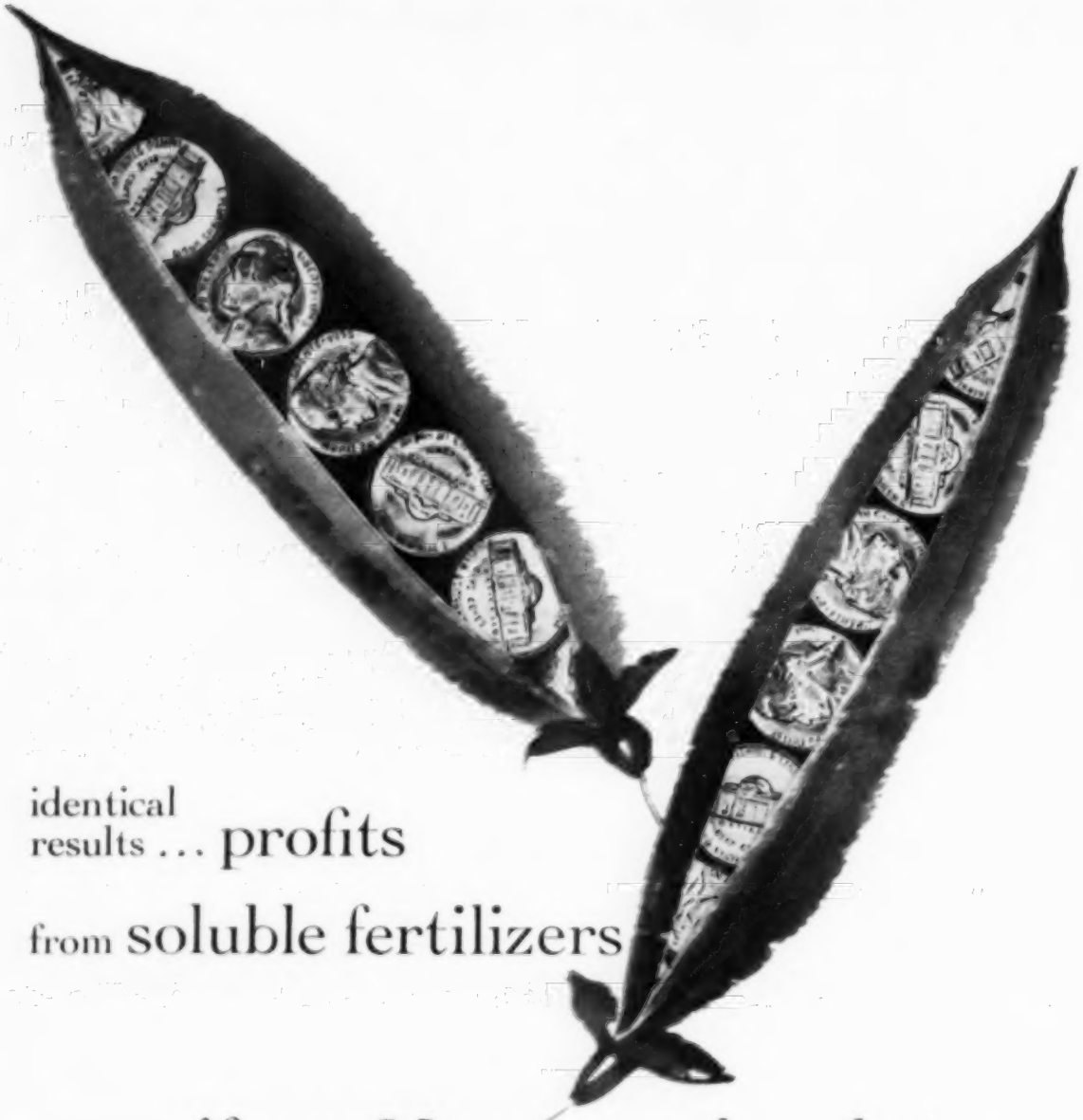

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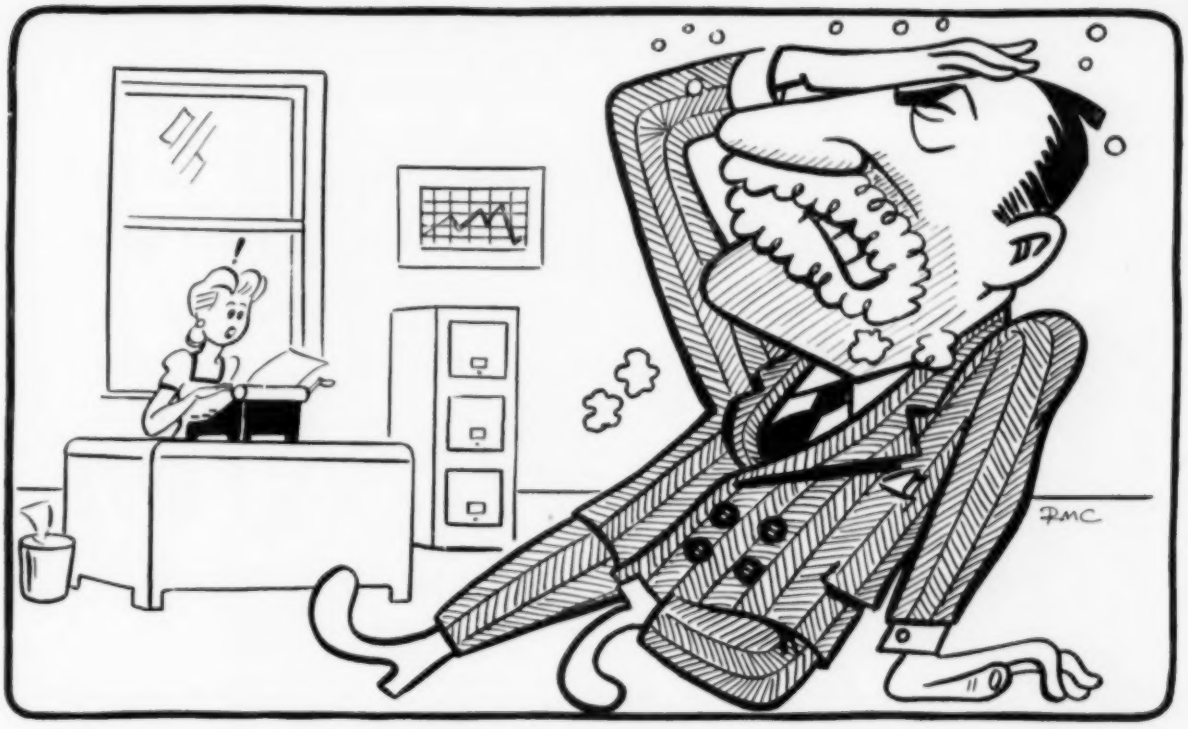

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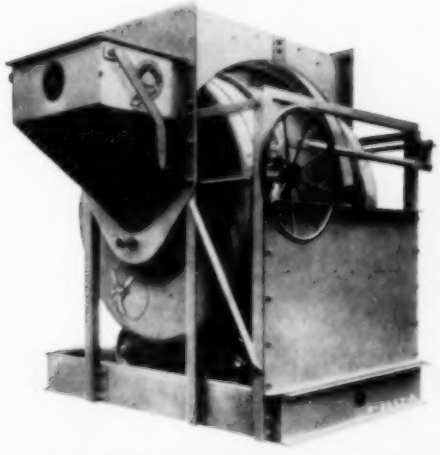

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*Tetraethyl Pyrophosphate is made from triethyl phosphate—an Eastman chemical. TEPP is not supplied by Eastman Chemical Products, Inc.

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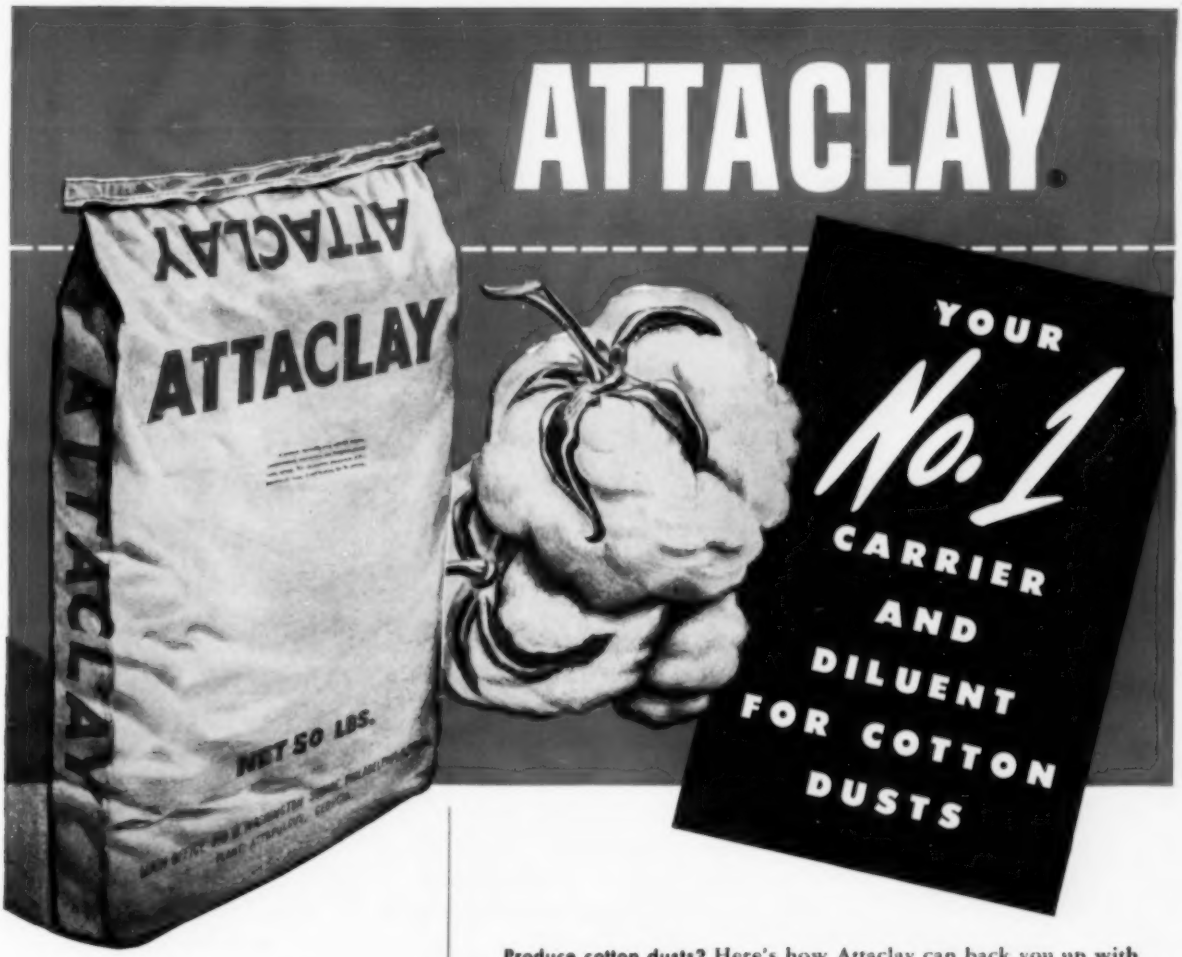

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Accenting the Positive

by
Lea S. Hitchner

Executive Secretary, National Agricultural Chemicals Association

FOR a good many months now many of us in the pesticide industry have had the tendency to look on the dark side of the picture of the business of producing, developing and marketing agricultural chemicals. It may be opportune to begin to emphasize the positive aspects and to build on the plus items which are part of our whole picture, and which, if vigorously promoted, should result in further expansion of uses in two or three years.

Most of you will agree that we have created a broad market for the industry's products in agriculture—a market which is here to stay and which is becoming less and less seasonal in nature as the scope and use of our products are broadened. Not so many years ago the use of pesticides was confined largely to two to three months out of the year for the control of insects of fruit, vegetables and other crops grown on an intense basis. Now we have many chemicals which are used on the cereal and fiber crops, opening up an entirely new market and extending the season of chemical use on both ends. We have pre-emergence weed control chemicals which are used when the crop is planted, we have weed control materials which are used during crop growth on vast acreages and we have defoliation chemicals and other crop conditioners which are used to facilitate harvesting with machinery. We also have many new uses and new materials for control of livestock pests which have broadened our market.

All of these practices complement the present agricultural philosophy which is to reduce the number of man hours required for a unit of production. Still this is only part of the whole situation where chemicals as aids to agriculture offer outlets previously considered impractical. It is an unquestioned fact that it is increasingly difficult to interest young people in remaining on the farm, and a consequent labor shortage has occurred. As a substitute for a portion of this labor shortage, chemicals now offer an economical and practical solution to this problem. At no time in our history has an opportunity arisen where actual necessities have been supplied by our industry on such a wide scale. At the same time we are in the best position in our history to supply the most effective and the widest choice of materials ever known in the entire history

(*Turn to Page* 130)

Editorial COMMENTS

IN a recent report to the President on United States-Latin American relations, Dr. Milton Eisenhower pointed out that U. S. trade with Latin America amounted to about three and a half billion dollars in each direction in 1952, adding that Latin America as a market for our exports is as important to the U. S. as all of Europe, and more important than Asia, Africa and Oceania combined. What is more to the point, Latin America, as noted, sells to us as well as buying from us, and does not need to seek financial grants. Thus there is a sound basis for a continuing and mutually profitable trade.

When our domestic market can no longer absorb some of the substantial surpluses of raw materials that will inevitably develop with continued expansion in our productive capacity, and when European aid programs are eventually terminated and Europe is no longer in position to "buy" from us with our own money, this Latin American market will loom even larger in its importance to us.

All of this preamble lends much point to the recent program initiated by the Potash Export Association to analyze the agricultural problems of Latin America and to set the stage for eventual substantial increases in our exports of potash and other agricultural chemicals to Latin America. The program involves a study of the agricultural needs of Latin American countries and would also naturally include education in fertilizer application, as well as in use of insecticides, herbicides, fungicides, etc.

In view of the eventual implications of such a program, and the contribution it could make toward developing an important export market for American agricultural chemicals, this is an activity with which the entire agricultural chemical industry should be glad to cooperate.

A NATIONAL program to stimulate increased use of pesticides is just getting under way with the cooperation of various industry trade associations. The tools which the new program will employ include a four color poster for nation-wide distribution (see front cover of this issue of *Agricultural Chemicals*) and a booklet to be distributed to dealers giving them information which will be helpful in merchandising pesticides and sprayers.

The new program marks a distinct forward step for the industry,—and one which can be helpful in reversing the downward trend of pesticide sales which has been all too aparent over the past two seasons. Everyone has talked for years of the need for educating pesticide dealers, but far too few have done anything about it. And with the large number of new pesticidal chemicals which have been introduced over recent years, it is no wonder that the average dealer has found it almost an impossible task to keep up with new developments in the pesticide field.

What product is recommended for the control of a specific insect pest? In what concentration? What spray schedule? How applied? How does one guarantee safety in use? These

(*Turn to Page* 151)

Radiotracers in study of*

SYSTEMIC INSECTICIDES

Figure 1, top: Spraying P^{32} labeled systox-isosystox formulation on Valencia oranges. Figure 2, bottom: Spraying P^{32} labeled OMPA on cotton.

By R. L. Metcalf

Univ. of California, Riverside, Calif.

THE systemic insecticides octamethyl pyrophosphoramide (schradan), and O,O-diethyl O-ethyl-beta-mercaptoethyl thionophosphate (systox), and their derivatives have shown unusual promise for the control of mites and aphids and other sucking insects on a variety of agricultural crops. However, these materials are known to be freely transported throughout living plants and to be concentrated in certain rapidly growing tissues. As a result, exact knowledge of possible deleterious residues in edible produce is required. Moreover, it is apparent from investigations conducted with schradan and systox that systemic compounds may be readily transformed by enzymatic processes in plants and in animals into secondary metabolites whose physicochemical properties and biochemical and toxicological activity may be markedly different than those of the original material.

Although several methods have been proposed for the quantitative estimation of schradan and systox, they have in general proved to be inadequate to follow the variety of biochemical changes exhibited by the systemic molecules in living tissues, and because of lack of specificity and sensitivity have left something to be desired in residue analysis.

Method of Study

THE systemic compounds currently in use are all organic phosphorus compounds, having the common mode of toxic action of inhibition of cholinesterase and other esterase enzymes. This is accomplished by the binding of the central phosphorus atom firmly to the surface of the esterase enzyme in a manner which blocks the access of the normal enzyme substrate, such as acetyl choline. Therefore, it is apparent that any toxic metabolite formed will contain a phosphorus atom and the use of radioisotopes containing P^{32} as tracers for systemic insecticides is especially informative. The radio-phosphorus is nearly ideal because of its high intensity β-radiation (1.69 MEV), its short half-life (14.3 days) which prevents long term contamination, the relative ease of synthesis, and the low cost of the radioisotope.

Syntheses of P^{32} labeled schradan and systox have been reported (Gardiner and Kilby, 1950, Gardner and Heath, 1953). The procedures used in our laboratory are similar and involve the reaction shown on page 34. The distilled product (Schradan) was an odorless water white liquid which behaved as a single component in paper chromatography upon ethylene glycol impregnated paper (March, *et al.*, 1954) and had an initial activity

*The research described was financed in part by generous grants from the U. S. Atomic Energy Commission, Contract AT-(11-1)34 Project 6, Dr. F. M. Turrell, Director, and from the Pittsburgh Agricultural Chemical Co. The Monsanto Chemical Co. and Pest Control Ltd., England, kindly supplied radiotracer materials. H. T. Reynolds, M. M. Barnes, J. C. Ortega, P. D. Gerhardt, and Marion Sprott cooperated in various phases of the work.

Schradan:

$$P^{32}OCl_3 + 2\ Me_2NH \xrightarrow[6^\circ]{\text{ether}} (Me_2N)_2\,P^{32}Cl + Me_2N)_2POEt \xrightarrow[\text{xylene}]{170^\circ} (Me_2N)_2\,P^{32}\text{-}O\text{-}P(N\,Me_2)_2 + Et\,Cl$$

Systox:

$$P^{32}Cl_3 + S \xrightarrow[AlCl_3]{} P^{32}SCl_3 + 2\ EtONa \longrightarrow (EtO)_2\,P^{32}Cl + NaOCH_2CH_2SEt \xrightarrow[Cu]{Na_2CO_3} (EtO)_2\,P^{32}OCH_2\,CH_2\,SEt$$

of 4.7 c.p.s. per microgram. When partitioned between chloroform and normal sodium hydroxide, a ratio of 27.8 to 1 was obtained.

The distillate (Systox) was a water white liquid, approximately 99% pure when tested by paper chromatography on silicone-treated paper (March *et al.*, 1954); and had an initial activity of about 2 c.p.s. per microgram. This product is readily isomerized nearly quantitatively to isosystox, O,O-diethyl S-ethyl-beta-mercaptoethyl thiophosphate, by heating to 120° C. for four hours (Fukuto and Metcalf, 1954), and blends of the two isomers in 65:35 ratio were prepared, which approximate the composition of the technical product.

Once the necessary apparatus is assembled and trial runs are completed, 10 millicurie lots of either of these compounds may be synthesized for a total cost not exceeding $100 per millicurie.* The proportional cost will decrease as larger amounts are prepared. Such tracers prepared from highly active P^{32} will provide easily detectable activity for four half-lives or longer, and have been used in field experiments over a two-months' duration. Because of the quick decay of the P^{32}, and the fact that its β-radiation will penetrate only the outer layers of the skin, relatively simple precautions will suffice in the handling of these tracers in the small quantities employed.

The radiotracers described above may be utilized for the ready quantitative estimation of the maximal amounts of toxicant which may be present in plant or animal products. For this purpose they may be formulated in exactly the same manner as the ordinary technical insecticide, or if they are very highly radioactive they may be first diluted 1:4 or 1:9 with non-labeled material. However, with the low rates of application commonly used for the systemic materials, i.e., 0.2 to one lb. per acre, extensive investigations can be conducted with the approximately six to ten grams of tracer insecticides obtained from 10 millicuries of P^{32}. This amount when formulated is adequate to treat from 0.1 to 0.05 acre of cotton or other field crops, or 5 to 20 small fruit trees such as apples, oranges, pears or walnuts. The actual amount needed depends, of course, on the size of plants and desired dosage.

*2.7×10^7 c.p.s.

Application of Tracer Materials

An important problem in the use of the tracer materials for residue studies is in the proper application to the crop. Where very dilute spray solutions are to be applied, the tracer material can be applied by conventional power equipment using minimum amount of water. However, in most applications of systemics, concentrate sprays are used at dosage rates of from 10 to 200 gallons per acre. In such cases, the five to 10 g. of tracer material available will be applied in from one quart to four gallons of spray. For this purpose, it has been found that the cylindrical type of compressed air sprayer commonly used by the home gardener is entirely suitable. This equipment holds from three to five gallons, yet can be operated at 30 to 40 pounds pressure. Nozzles are available which provide good atomization, and the tank can be filled easily with the radiotracer and used without appreciable hazard of contamination. The use of this equipment for spraying cotton and oranges is shown in figures 1 and 2. The operator should protect himself from contamination by protective coveralls, gloves, hat, and respirator, and although the radiation from the treated foliage has not exceeded 0.4 milliroentgen per hour in any of our experiments, it is advisable to fence off the treated areas and plainly mark them as contaminated with radioactive poison.

Immediately following application it is desirable to pick samples of treated foliage and fruits to determine initial deposit. Subsequent harvests are taken at 2- and 4-week or other intervals, depending upon normal harvest practices. Sampling, replication of treatment, etc. should be carried out as in any careful residue analysis work.

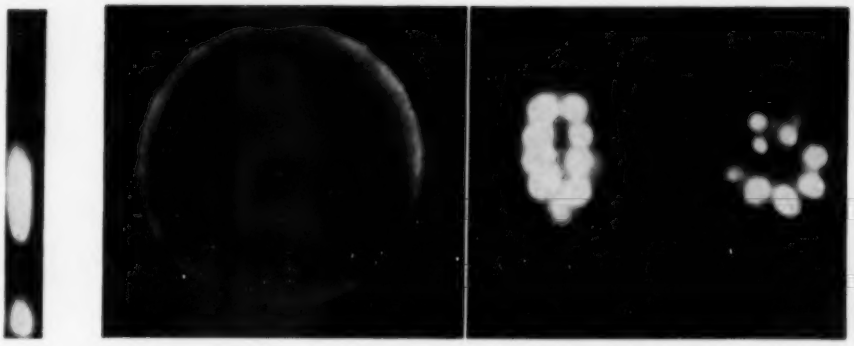
The analytical procedures used in the separation and extraction of the toxicant are entirely conventional, with the advantage that since there is no possibility of contamination by natural products or even by other spray applications, separation and detection of the radiotracer is facilitated. In general, the surface residue is extracted by washing in benzene, chloroform, or acetone and the solvent concentrated and evaporated in planchets for radio-assay by the end window Geiger tube. The washed produce is then peeled or hulled, if necessary, and the constitutent parts homogenized in the Waring blender or similar equipment using about an equal weight of solvent such as chloroform, which is known to extract not only the insecticide but its metabolites. The homogenate is thoroughly shaken to bring about complete extraction and then the solvent is filtered off, concentrated under vacuum, and assayed for radioactivity.

The precision and sensitivity of analysis by the procedures described are astonishing. One microgram or less of tracer can be readily and re-

Figure 3, left: Radioautograph of paper chromatogram from technical S^{35} systox.

Figure 4, center: Cross section of mature orange treated with 30 times the normal dosage of P^{32} labeled systox. Activity is confined to the peel.

Figure 5, Extreme right: Radioautograph of cross section of immature cotton boll sprayed with P^{32} labeled schradan. Most of the activity is localized in the seeds.



liably detected, and if 1000 grams of produce are employed per replicate a sensitivity of 0.001 p.p.m. is obtainable. This is far better than the sensitivity of normal colorimetric procedures for residue analysis which rarely are reliable to 0.1 p.p.m.

Radiotracers for Residue Analysis

THE utility of radiotracers of systox and schradan for residue analysis has been demonstrated in our laboratory by several experiments which will be briefly described, as more extended accounts will be published elsewhere. A preparation of P^{32} systox was partially isomerized to a 65:35 systox-isosystox mixture, and this was formulated with four parts of "Thiosolve," dispersing and wetting agent. The formulated material was dispersed in water at the rate of 0.25 lbs. toxicant to 100 gallons. This material was sprayed on 10 young walnut trees, 5 young Valencia orange trees, and 5 young apple trees, thoroughly wetting fruit and foliage (figure 1), to give a final rate of application equivalent to 0.5 lb. per acre on mature trees. Replicates of 10 oranges and apples, and 20 walnuts were harvested in two and four weeks after spraying. The average residues obtained at the four weeks harvest calculated as systox were: apples 0.007 p.p.m.; orange juice 0.02 p.p.m, and walnut meats 0.009 p.p.m. Similar studies conducted on potatoes sprayed with the same formulation showed harvest residues of 0.05 to 0.07 p.p.m. in the tubers.

In another experiment, three rows of young cotton plants, aggregating 0.01 acre were sprayed with P^{32}-schradan at the rate of one lb. per acre in 25 gallons of water (figure 2). After 41 days all the cotton was picked, each row serving as a replicate, and a total of 21 pounds was obtained. This was ginned, and the raw oil extracted and refined by standard methods. The raw oil contained an average of 109 p.p.m. radioactivity calculated as schradan, while the cottonseed cake contained 167 p.p.m. After refining, the content of the oil was reduced to 0.02 p.p.m. By partition techniques, as discussed below, it was demonstrated that radioactivity in the raw oil was largely intact schradan but that the radioactivity in the cottonseed cake was in the form of non-toxic metabolized products.

The use of radioautographs made by placing leaves and tissue sections in contact with X-ray film for several weeks provides additional information as to the localization of radioactivity. Examples are shown in figure 5, where schradan sprayed on cotton plants is shown to be concentrated in the seeds, and in figure 4, where the penetration and dispersion of systox and isosystox in an orange fruit, is indicated.

In the residue analysis experiments described, only the total radioactivity present was measured and this was assumed to represent the maximum amount of toxicant which could be present. Such a determination is comparable to the total chlorine method for measuring the extent of contamination by the chlorinated hydrocarbon insecticides. Obviously such determinations yield no information regarding the possible metabolic transformations taking place in the plant tissues. Investigations by Hartley, *et al.* (1951) and Heath (1952) have demonstrated that both schradan and systox are subjected to a variety of transformations, probably largely enzymic, taking place in the plant tissues and it is clear that it is essential to understand the biochemical behavior of the systemics in order to use them intelligently and to properly evaluate any residue hazards which may be encountered.

Here again, the use of radiotracers provides the most satisfactory solution to such problems. However, two auxilliary techniques must be employed to effect the separation and identification of the various P^{32}-labeled compounds formed by plant metabolism. The use of partition-coefficients between immiscible solvents was demonstrated by Hartley, *et al.* (1951) to indicate the metabolism of schradan. It was shown that schradan itself partitioned about 24:1 in favor of chloroform over one normal sodium hydroxide, while various nontoxic products formed from schradan predominantly partitioned into the sodium hydroxide phase. This technique was used in the experiment with cotton described previously to demonstrate that the radioactivity in the cotton seed meal was due to metabolized schradan, while that in the oil was schradan itself. This method has been extended by a series of consecutive partitionings to the "countercurrent distribution apparatus" which has been used to isolate an active metabolite of schradan which is responsible for its toxicity to insects and animals (Cassida and Stahmann, 1953). This equipment has also been used in our laboratory to separ-

(*Turn to Page* 128)

Modern Methods

Speed Production

WHEN Agricultural Fertilizers Chemicals Co. asked Hewitt-Robins Inc. to design, engineer, fabricate and install its new fertilizer plant in Edison, Cal., the conveyor company set up a plant that it says is a model of efficient operation, using automatic processes that cut waste to a minimum.

The H-R western division engineers took into consideration the problems involved in bulk storage, transporting and blending dry fertilizer materials and packaging the finished product or moving it for bulk loading. Modern equipment of all types is used in the plant, which handles 40 tons of fertilizer an hour. Hewitt-Robins declares the installation is a good example of the versatility of its line of equipment, most of the units having been produced in H-R shops.

James Bonaventura and Frank Waterman, general partners at AFC, wanted an efficient production line setup to handle increased demand for their products in a territory which centers around the southern end of the fabulously productive San Joaquin valley in California. The layout designed by Hewitt-Robins for the new AFC plant employs an efficiently integrated series of detachable hoppers, screw conveyors, bucket elevators, belt conveyors, Payloaders, cluster hoppers, vibrating screens, a hammer mill and a blending mixer.

James Bonaventura Frank Waterman

Three Parts to Plant

The plant is set up to store, process and package various NPK mixes, with 17-7-0, 15-8-4 and 20-15-5 the most popular grades. To do this, H-R divided the plant into three parts: the bulk storage system, capable of unloading and placing into storage 40 TPH; the blending system, which also handles 40 TPH and the packaging unit, which sacks 10 TPH, with the remaining 30 TPH being loaded into bulk trucks.

Bulk Storage System

Taking the plant layout from raw material to finished product, here's how AFC produces fertilizers at its Edison location:

Biggest problem involved in the bulk storage system is transferring dust-type materials from a box-car to one of 12 crib-type storage bins in a building 200 feet long and 100 feet wide, located 10 feet from the railroad. Because of the dusty nature of this material, AFC uses small model Hough Payloaders to scoop it into the railside, detachable hopper. One man, in one hour, can empty a 40-ton box car, AFC reports.

The detachable hopper is secured to a 12-inch diameter screw conveyor feeder which carries the material to a Robins S-61 Centrifugal bucket elevator. The material is elevated above the storage bins and discharged into a H-R 16-inch by 100-foot troughed belt shuttle conveyor.

Because of the tendency of bulk fertilizer materials to "set up" or harden when left for long periods in storage, a crib-type bin is utilized in the plant. The bin top remains open, the bottom is flat and usually part of the building floor and the sides are vertical, with a wide door in one side to facilitate discharge of the stored ingredients. This discharge is accomplished by using the same Payloader used for unloading the box cars.

In describing this bin conveyor, Hewitt-Robins explains that in many instances where long storage-bin lines are maintained, the screw conveyor has taken precedence over the belt conveyor. The company says that in the AFC installation it feels the belt conveyor has proved its versatility.

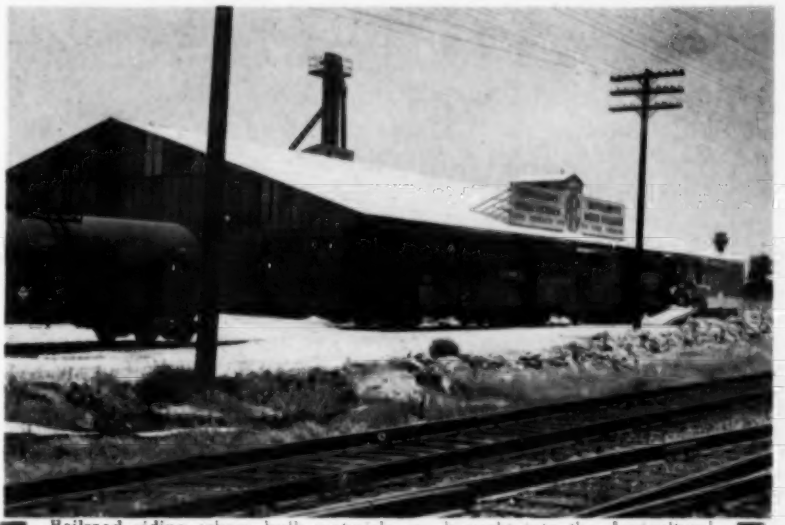
The shuttle conveyor was chosen for three reasons: possible build-up of material on screws and troughs, extreme length (in terms of horsepower) and necessity of having many discharge gates and means of actuating them on the screw conveyor. H-R says the shuttle conveyor was the obvious choice, price-wise from the point of view of longer service.

Blending System

Three basic functions are involved in the blending system: compounding the formula, obtaining proper ingredient consistency for intimate blending and the blending itself.

To begin these functions, raw material receptacles must be established in the processing area. In the AFC plant, six three-ton hoppers in cluster, each with air-actuated clamshell gates, are located at a height above the floor practical for efficient Payloader operation. The Payloader transports ingredients from the storage area to the blending area as they are needed.

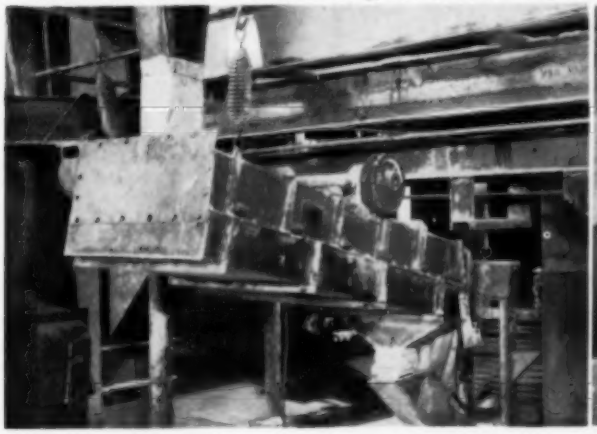
The ingredient bin gates are located over a 2000-lb. hopper, which



Railroad siding where bulk materials are brought into the Agricultural Fertilizers Chemicals Co., and transferred with a Hough Payloader.

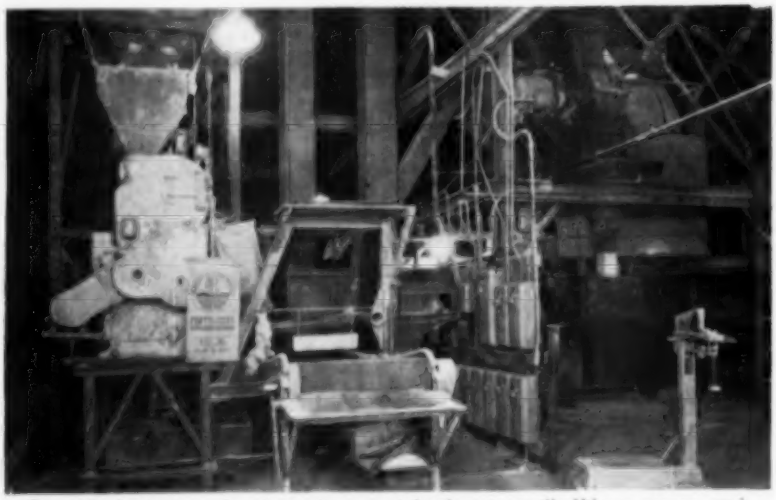
View of the shuttle conveyor at the AFC plant. Transition from the loading elevator is at far right. Shuttle conveyor is cheap, long-lasting.

Vibrex screen, totally enclosed, is installed below the hammermill. The screen handles sizing, assures consistency.



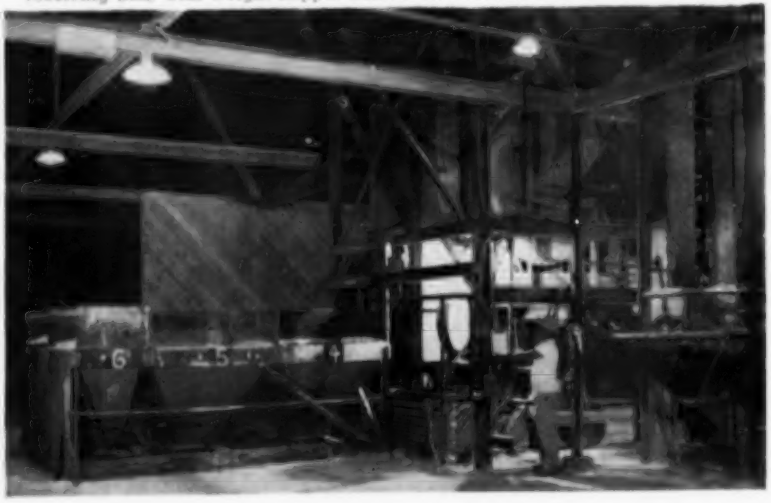
Drive and enclosure arrangement for the Vibrex screen, which handles all material passing through the plant.

Larger view shows batching hoppers, elevator to Vibrex screen, discharge chute from Worthington mixer and feeder belt from mixer to the bulk loader.



General plant view showing mixer at right, hammer-mill, Vibrex screen and cross conveyor from mixer to elevator. At left is receiving hopper and bagger.

Another view of the plant, this one taken from opposite side. At left are receiving bins with weight hopper below. At center is scale bin and elevator.



is suspended in a pit between scale lever beams that are linked to a floor-mounted scale face near the bin air gate controls. The one-ton hopper is sloped to accommodate a 12-in. diameter discharge screw feeder which projects far enough from the hopper to discharge into an elevator. The hopper, conveyor and conveyor drive comprise an integral unit which literally floats downward as the formula is compounded. The conveyor discharge is secured to the elevator inlet by a flexible coupling.

After a full load of material is obtained in the hopper, the operator starts the screw conveyor, then shuts off the hopper with a push button control after discharge is complete.

Contents of the weigh hopper then are elevated by a Robins S-61 Centrifugal bucket elevator and discharged over a Robins M-700 Vibrex 48-in. x 110 in. single deck screen with fourmesh cloth. At this point in the process, consistency is controlled. The Vibrex screen handles the sizing; "throughs" going directly to the Ransom blender and "overs" spouted to a small Williams G.P. 106 hammer mill, then spouted back to the bucket elevator to be recirculated to the screen.

Ribbon Mixers Used

Doing the blending are two S. Howes horizontal ribbon mixers. One would have been sufficient under ordinary circumstances, Hewitt-Robins stated, with a holding bin under the mixer and over the packers to assure continual operation. But, because of the hardening tendency of fertilizer materials and the possibility of segregation created by the drop from mixer to bin, two mixers are utilized, one always acting as a holding bin to over-ride the time lapse, at the same time keeping the material in motion as it is sacked off.

Engineers at H-R explained that the difference in price and type of installation is great enough to warrant the use of a screw discharge in smaller hoppers. They added that weight of material over the conveyor determines when a belt should replace a screw. Two obstacles can occur when extreme tonnage is discharged from the

weight hopper: the weight can cause a bridging effect or the screw can choke because of the decrease in conveying area when the material leaves the hopper and discharges into the screw trough. In both cases, H-R engineers have found, the situation can be eliminated by substitution of a belt conveyor.

Packaging System

The packaging setup at the AFC plant permits sacking the fertilizer in 100-lb. paper valve flap bags or loading it into bulk trucks by means of a loading chute outside the building. Key feature of the automatic packaging is the interlocking air-operated gate unit from the screen to the packer, which insures continual operation and the impossibility of "double-batching" either mixer.

An air-operated flop gate is set between the screen "throughs" hopper and the two mixers. Each mixer is equipped with an air-operated slide gate. The material flow-spouts from the mixers converge to one common spout which is split either to feed two Vredenburg single tube packers, or an H-R 16-in. troughed inclined belt conveyor to bulk loading. One air valve in the packers' area operates all air gates, which are arranged so that when formulated material from the screen is fed to the No. 1 mixer, the No. 1 mixer gate is in closed position and the No. 2 mixer gate is open. When the operator empties, or sacks off contents of the No. 2 mixer, he reverses the air gates, etc.

In the case of bulk loading, the operator merely switches a diverting gate above the packers to direct material to the belt conveyor which elevates it to the loading chute.

In addition to the dry fertilizer plant, AFC also operates a complete liquid layout including an automatic converter making anhydrous ammonia into a 20 per cent aqueous solution, with a capacity of one 25-ton carload of anhydrous in four hours.

Also included in the facilities is an extensive insecticide plant, including a dust formulating plant with a 12-ton per hour capacity and an emulsion plant with a batch capacity of 1000 gallons.★★

Bulk loading and bagging elevator is part of efficient AFC bulk operation, which handles 30 tons of fertilizer per hour. Belt conveyor elevates material.

Bulk liquid fertilizer loader is used for field applications of fertilizers. Truck transports liquid fertilizers.

Practical Use of Insecticide in

Livestock Pest Control

ARE flies on livestock in the midwest actually being controlled? Reports of fly resistence to certain formulations have led in some cases to the conclusion that all flies are resistant to all insecticides, but judging from tests made in Kansas, Missouri and other central states, it is only the housefly that builds up some immunity to the effects of a single compound, such as DDT, when it is used for a comparatively long period. Livestock pests of the common variety, such as horn flies, stable flies and horse flies, have not developed this trait to any great extent in the midwestern area.

But as far back as 1948, tests in Johnson County, Kansas, revealed the presence of a tough strain of houseflies that could survive a 2% DDT spray applied to barn walls and ceilings. By adding a little high gamma BHC to a 0.5% spray, however, the flies were controlled easily and quickly. They couldn't tolerate the "mixed drinks."

Standard Mixtures Used

EXPERIMENTAL work in 1948 indicated that mixing a long-residual insecticide like DDT with a quick-killer like BHC does an efficient job in controlling flies, lice and ticks on livestock. When the temperature gets up around 100 degrees, the killing efficiency of DDT decreases, but the activity of volatile materials like BHC and lindane supplements the slowed-down action of DDT. During the past five years, most beef cattle growers and hog men in the mid-America area have been using successfully a spray mixture of 8 pounds of 50% wettable DDT, plus 4 pounds BHC, 10% gamma, to 100 gallons water as a standard summer-time mixture for fly and louse control. Some add three pounds fused bentonite sulphur to this mixture. During the horse fly (Tabanid) season, we double the amount of BHC in this mixture. Today, practically every livestock grower is alert to the losses he is likely to sustain if he fails to rid his animals of flies, lice and ticks. Now, he considers it just as important to treat his cattle for flies and lice as to salt them. Now, when many Southern cattle growers sign their contracts for summer pasture in the Flint Hills of Kansas and Oklahoma, the contract calls for regular, thirty-day treatment of cattle for flies and lice.

As long ago as 1945, co-operative tests were conducted on 8,000 cattle, with the U. S. Bureau of Entomology, Kansas State College, Kansas Livestock Association and the National Livestock Loss Prevention Board. It was found there was an added average gain of 50 pounds per head on the DDT treated, beef cattle over the untreated cattle. Consider what this would mean in additional pounds of meat, if our nation's present 93,000,000 head of cattle could be kept fly-free and make like added gains! In 1952 some 18.5 million cattle were slaughtered in the United States. The added gains on these slaughtered cattle alone could total 925,000,000 pounds that would yield about 616,000,000 pounds of extra meat. It is estimated that one out of every ten bushels of grain fed to livestock is lost because of louse infestation.

Improvements Made

UPON spraying the Wolferman Dairy Barn, Jackson County, Missouri, in 1948 with 1.0% methoxychlor and 0.03% lindane mixture, it was noticed that in two days the average horn fly count on cows coming into the milking barn twice a day dropped from 165 to 80 per cow. This was the first indication that lindane sprayed on barn walls would vaporize and kill flies on cows coming into the barn for milking! Fly population on cows could be checked without spraying the cows, themselves!

Late that summer, it was learned definitely that by increasing the concentration of lindane, control was possible on all flies,—house, stable and horn,—simply by spraying the walls, ceilings, windows and floors of the milking barn and feed rooms. In addition, the outside as well as inside of test barns were sprayed—under the eaves, board fences and near-by trees, —to control stable and house flies.

It was soon learned that every square inch of inside barn surface should be covered with lindane spray, so that vaporized gas would be given off from all barn surfaces. Although air currents reduce the efficiency of lindane vapors, operators do not shut barn doors and windows which are

By
RAY CUFF
National Livestock Loss Prevention Board
Kansas City, Mo.

open regularly for ventilation. If this system will not work under normal farm operations, farmers will be reluctant to use it.

In 1950 and 1951, on the A. H. Schmidt & Son Farm, Clay County, Missouri flies were controlled on 60 Angus steers in the feed-lot without spraying the steers. The spray was applied to only the feeding-barn, trees in the feed-lot, fences, feed-bunks and ground around feed-bunks, three times each season. Horn and stable flies presented no control problem, but the droppings and molasses in feed attracted house flies from near-by yards. In 1950, the spray mixture was 2.0% toxaphene and 0.5% BHC; in 1951, 2.0% DDT and 0.5% BHC. To supplement the spray application, the feed alleys and floors of feeding barn were dusted twice with BHC, 10% gamma.

For the past three seasons, flies have been controlled on dairy cows simply by spraying the unscreened, milking barns. Not one drop of insecticide was put on cows coming into the barn for one hour, twice a day, at milking and feeding time, even during the seasons when molasses feeds were fed. None of these test barns was sprayed more than four times, some three, during the entire fly season, May 29 to October 10. Periods of protection ranged from 30 to 33 days. Dairymen like it, naturally. Their enthusiasm is expressed by Arthur Jensen, Johnson County, Kansas, a cooperator the past three years who said: "This system is 'tops', as far as I am concerned. The cost is a little less than one cent per cow per day. When we used to spray the cows in stanchions, there'd always be a drop in milk production for two or three days. Spraying excited the cows and some udder injury was noted. Now the barn is sprayed and the cows don't know about it; we have no injury and better production."

In 1950, 0.3% lindane, in wettable powders and emulsions was used in barn spray tests. In 1951, 2.0% methoxychlor and 0.3% lindane, in wettable powders and emulsion sprays was employed. In 1952, we used 2.0% methoxychlor with lindane in 0.3%, 0.4% and 0.5% concentrations, wettable powders and emulsion sprays. It was noticed that fly counts, especially stable fly, were highest on cows in drafts near doors or windows or on cattle standing on a cross air-current. In view of the fact that the Jensen barns have been sprayed the past three successive years with 0.3% lindane wettable powders and with 2.0% methoxychlor added the last two years, and as the material is still killing horn and stable flies on cows coming into the milking barn, there is no apparent evidence that stable and horn flies are any more resistant to lindane than when the test started three years ago.

Dusting Aids Control

WE have found dusting dairy barn floors and window sills with a lindane-methoxychlor mixture especially effective in smaller barns. A teaspoonful of lindane is sifted on window-ledges where windows swing in, from the top and where the dust is not blown off the ledges. Dust the dairy barn-floor next to the stanchion base once a week with lindane powder to clear the cows' front legs of stable flies.

Dusting sunlit areas in front of doors and windows has given good dairy barn fly control. In smaller herds, flies can be controlled by dusting animals once a week with recommended mixtures. It is a good practice to dust where the flies are. For three years flies have been controlled in calf barns by suspending from the ceiling a soft, frayed rope, soaked in a 20% lindane emulsion. Results were not as good from painting non-porous, rubber-coated light wires or galvanized pipes with the lindane emulsions.

Application Important Too

MANY so-called failures of insecticides are due to faulty application together with lack of sanitation. Application is as important as materials used. The "know-how" is most important.

When we spray beef cattle top and underline for flies during the summer with an insecticide that kills both lice and louse eggs, winter treatment for lice is unnecessary. In cold weather, dusting lousy animals with BHC over a clean straw bed is a practical, though not always perfect method.

With the number of farms in the U. S. decreasing to around 6,000,000, with the cattle population up to near 93,000,000 head, and with human population in the United States increasing at the rate of almost 2,000,000 beef-eaters each year, insecticide manufacturers and livestock producers have a tremendous job on their hands,—that of keeping our tables supplied with animal as well as vegetable proteins.

To-day the farmer and livestock grower is in a tight position, with income reduced 8 percent and with things he has to buy reduced only 1 percent. He will shop more wisely for his insecticides and will seek to apply them better to increase his net income.★★

Wednesday, March 24

Presenting Potential and Scope of Pesticides In Promoting the Health, Comfort and Welfare of the Nation

10:00
Meeting Called to Order
Howard J. Grady
Vice Pres., Calif. Spray Chemical Corp., Richmond
Chairman of Program Committee

10:10
President's Address
Paul Mayfield,
general manager of Naval Stores Department,
Hercules Powder Company,
Wilmington, Del.

10:40
"Agriculture in Texas"
John C. White,
Commissioner of the State Department of Agriculture,
Austin, Texas

The Commissioner brings the story home with a discussion of the situation from the viewpoint of state administration.

11:00
"Research on the Use of Chemicals for Texas Agriculture"
R. D. Lewis,
Director of Station,
Texas A & M College,
College Station, Texas
A prominent leader of experiment station work points out some cooperative procedures in developing pesticides.

11:30
"The Agricultural Chemicals Credit Situation"
J. A. Walker,
Credit Manager,
Standard Oil Company of California,
San Francisco
An outstanding authority presents his views on the importance of sound credit administration and a practical method of applying these principles to our industry.

Noon
"Value of Pesticides In Raising Standards of Living and Health"
Stanley B. Freeborn,
Provost
University of California
Davis, California
An entomologist with a world-wide reputation portrays the great value of pesticides in improving the standards of living and health for all mankind.

NAC SESSIONS IN HOUSTON

EMPHASIZING many of the problems in distribution, sale, and use of pesticides, which have arisen during the past few years, the program of the annual spring meeting of the National Agricultural Chemicals Association centers attention on public relations, labeling, problems relating to research, production, use, and health where pesticides are concerned. The convention will be held at the Shamrock Hotel in Houston, Texas, March 24-26th.

Paul Mayfield, president of N.A.C.A., will open the conference, followed by J. C. White, commissioner of the State Department of Agriculture, Austin, Texas. R. D. Lewis, Texas A & M College will review some cooperative procedures in developing pesticides, and J. A. Walker, Standard Oil Co. of California, is scheduled to discuss the credit situation as it pertains to the agricultural chemicals industry. Dr. Stanley B. Freeborn, California College of Agriculture, will present an address on the value of pesticides and their contribution toward raising standards of living. Presiding officers will be Paul Mayfield and NAC vice president, W. W. Allen of Dow Chemical Co., Midland, Mich.

In general, Wednesday's session, according to the program released by L. S. Hitchner, executive secretary of N.A.C.A., is designed to present the potential and scope of pesticides in promoting the health, comfort and economic welfare of the nation. Continued technological developments, new uses and sound credit administration influence where and how the industry is going.

Thursday's program covers a discussion of the everyday problems relating to the research, production and use of pesticides. Top authorities, personally acquainted with the situation, will give first-hand information.

Friday's meeting is planned to give facts and reliable methods for the successful operation of the business of pesticide manufacturers as well as dealers, distributors, mixers, formulators, etc. The speakers are all outstanding in their respective fields.

(*Turn to Page* 149)

JOHN C. WHITE
Texas State Dept. of Agric.

J. A. WALKER
Standard Oil Co. of Calif.

R. L. LEWIS
Texas A & M College

PROVOST FREEBORN
California College of Agric.

Afternoon

Boat Trip

Excursion through the heart of the Petrochemical Industry of the South, courtesy of the Port Commission. Transportation furnished to and from The Shamrock. Limited to 48 persons; so register early.

6:30-7:30

Reception

Grecian Room, The Shamrock
Members, guests and members of the press are cordially invited.

Thursday, March 25

"Today's Problems Relating to the Research, Production and Use of Pesticides"
Shamrock Room
For members and Invited Guests
Admission by Ticket Only

10:00
Meeting Called to Order
NAC Vice President
William W. Allen,
Manager of Agricultural Chemical Sales,
Dow Chemical Co.
Midland, Mich.

10:05
Mayor's Welcome
Honorable Roy Hofheinz,
Houston

10:10
Secretary's Report
Lea S. Hitchner,
Executive Secretary,
NAC Association,
Washington, D. C.

Your Secretary presents some of the industry's problems on a national scale and from the viewpoint of the Association's activities and policies.

10:30
"Technology Implications"
Herbert L. Haller,
Government-Industry Liaison,
Washington, D. C.

A noted scientist who knows the overall picture points out the impact of scientific development of pesticides and the implications of their marketing and use.

11:00
"Public Reaction To Pesticides"
J. Clyde Wilson,
President of Arizona Cotton Growers Association,
Phoenix, Arizona

Some amazing experiences related by an individual who is both a successful lawyer and a cotton grower.

11:30
Question and Answer Period

Here's your opportunity to bring your questions to the experts. The NAC staff and Counsel will attend.

Afternoon
Golf Tournament

Prizes for winners. Courtesy of members of the Southwest Arrangements Committee. Register at registration table for participation. Time and place to be announced.

7:00
Chuck Wagon Dinner—Texas Style
Members Guests Press
To be held at a ranch near Houston. Transportation furnished. Obtain tickets at registration table.

Friday, March 26

A Presentation of Practical Methods and Principles of Importance to You and Your Customers.

Shamrock Room
For Members and Invited Guests
Admission by Ticket Only

10:00
Meeting Called to Order
NAC President
Paul Mayfield

10:10
"Responsibilities of Research and Production"
John D. Conner,
NAC Association Counsel,
Washington, D. C.

The legal counsel for the Association brings out the importance of proper research and production records.

10:30
"Responsibilities of Labeling, Advertising and Marketing"
Charles S. Maddock,
Chairman of NAC Lawyers Committee. The Chairman of the NAC Lawyers Committee will point up some legal considerations in the preparation of labels, advertising and sales contracts.

11:00
"Sound Cost Accounting Procedures"
Wilson T. Seney,
Associate,
McKinsey and Company,
New York City

In a down-to-earth manner, a widely experienced cost accountant offers some successful practical procedures.

11:30
"How to Get Better"
Joseph E. Burger,
Sales Manager,
Corneli Seed Company,
Saint Louis, Mo.

A successful sales manager tells us how to develop a bigger market for our pesticides with better selling methods.

PAUL MAYFIELD
President, NAC,
Hercules Powder Co.

WILLIAM ALLEN
Vice President, NAC,
Dow Chemical Co.

DR. H. L. HALLER
USDA Dept. Plant Research

HOWARD GRADY
California Spray Chemical Co.

MORE PESTICIDES

"Orthocide" garden fungicide, marketed by California Spray-Chemical Corp., contains 50% N-trichloromethyl mercapto-4-cyclohexene-1, 2-dicarboximide. "Isotox Garden Spray" incorporates 5% gamma isomer of BHC, 12.5% malathion, 5% DDD, among other ingredients, giving it triple control action as well as one of the most substantial percentages of meaningful active ingredients of any similar product on the market.

"Geigy's" garden dust and rose dust,—two products which sell widely in the small package home garden pesticide field.

FOLLOWING our review of the home garden market for pesticides in the November, 1953 issue of AGRICULTURAL CHEMICALS (Pgs. 38-43) we were reminded from various quarters that our coverage of the subject was far from complete. To our various correspondents we necessarily replied "guilty," as we recognized in advance that in a first article of this type it would be rather difficult, if not impossible, to be sure of mentioning every major factor in the field,—or every product.

We are glad to cover in this second installment on the subject a few of the products and companies inadvertently missed in our first round-up. And we urge other firms selling small package pesticides, fertilizers, etc., to supply us with photographs and pertinent details about such new products as they may introduce from time to time, so that we can run a continuing series of articles reviewing the type products and packages that are being marketed for the home gardener.

Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., New York, markets a rather full line of pesticides for the home gardener. Two of the most prominent items in the line are "Geigy Rose Dust" and "Geigy Garden Dust." The rose dust includes 3% DDT, 0.5% gamma isomer of BHC, 5% copper and 3.9% zineb. The garden dust is similarly formulated, but substitutes methoxychlor for the DDT and rotenone for the BHC. It also differs in that 2% pine oil is included in the formulation.

Geigy will introduce a new product this spring,—"Sequestrene NAFe." Designed to correct iron deficiency symptoms, the new product will be offered to the home gardener

for the HOME GARDEN MARKET

in a 1 lb. canister or a 1 lb. bag. Literature accompanying the new consumer packages accents the theme "put the bloom back into flowers and ornamentals . . . get more buds and flowers plus new dark green growth."

In addition to the above, Geigy of course also markets small packages of 50% wettable DDT, chlordane, methoxychlor, various weed killers, etc.

Monsanto Chemical Co., St. Louis, who have been marketing "Krilium" soil conditioners since 1952, are increasing their line of "garden shelf" products this spring by the addition of several new products. "Bogey," a multiple-purpose wettable (dust or spray) pesticide, and "D-Leet," a multiple-purpose lawn herbicide are two of the most prominent new items in the Monsanto line. The latter product is particularly unique in that it is, so far as we know, the only herbicide selling on the retail market to be based on MCP (2 - methyl - 4 - chlorophenexyacetic acid.) rather than 2,4-D. MCP is declared by Monsanto to be as effective as 2,4-D in controlling harmful weeds, yet more selective than 2,4-D in action against desirable legumes.

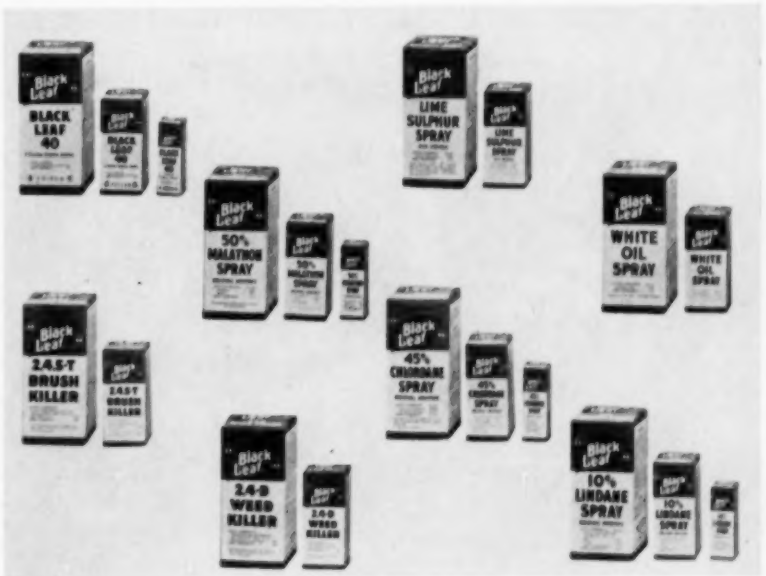
"Bogey," which contains in its formula a mixture of both contact and residual toxicants (DDT, 5%, rotenone, .75% and cube resins, 1.50%), is described as safe for use on vegetables, fruits and ornamentals. It also incorporates a fungicide, (Zineb, 5%), giving it multiple-purpose application against certain plant fungus diseases. It is also indicated to have miticidal action.

Monsanto are also introducing a new device which they call a "Foliator" for use in the application of water-soluble fertilizers. One bad snag in developing the market for water-soluble fertilizers has been the

The family resemblance idea is carried out consistently in these two lines of home garden specialties.

Above: "Folium" and "Krilium" packages sold nation-wide by Monsanto Chemical Co., St. Louis. New items in the Monsanto line this season, and not pictured here are "Bogey" all-purpose pesticide and "D-Leet," a new herbicide based on MCP.

Below: Some of the small package products for the home gardener produced and marketed by the Black Leaf Products Division of Virginia Carolina Chemical Corp., Richmond, Va.



Pennsylvania Salt Mfg. Co., Philadelphia, offers a full line of insecticidal products for the home gardener under its "KNOX OUT" brand. "KNOX-OUT" farm insecticide, for control of flies and mosquitoes around dairy barns, as well as lice, mange and ticks on livestock, and insects on garden plants, contains 25% lindane.

Their garden dust is a combination insecticide-fungicide packaged in a 2-lb. box with a shaker-top. It contains 42.8% cryolite, 5.1% copper and 3% DDT.

Their multipurpose garden dust—for use on vegetables as well as flowers and ornamentals—contains a mixture of active ingredients which includes DDT, cryolite and copper. Packaged in a blower-dust-gun.

relatively high cost and low efficiency of many of the devices sold for applying these materials. With its new "Foliator," a low-cost, high-strength plastic applicator, Monsanto hopes to expand the market for sale of water-soluble fertilizers such as its own "Folium."

Several interesting new fertilizer products for the home gardener have recently made their appearance. "Grow Power Planter Mix," described as a hybrid cross between a compost-base organic fertilizer and a potting soil, is a new gardening aid which is marketed in a multi-color printed polyethylene bag. The product is jointly produced and distributed by American Brand Fertilizer Co., Hobart, Ind., and Benson Maclean, Bridgeton, Ind.

Another new product is a combination conditioner-fertilizer sold under the name "Bantus" by Soil & Plant Foods, Inc., 80 Wall St., New York. It is said to be made up of natural organic mineral composted lignin shale combined with activated nitrogenous meat and vegetable tankage. To this base are added commercial plant food elements to make a 6-10-4 formula fertilizer. Trace elements are also added. It is offered in 1, 2 and 5-lb. containers, as well as in bags.

Better Products, Packaging Needed

THE importance of better products, improved packaging and aggressive and intelligent selling in this home garden pesticide market are emphasized in a commentary on the market outlook by J. M. Merritt, sales manager of the Black Leaf Products Division of Virginia Carolina Chemical Corp., Richmond, Va., who have for years produced and marketed one of the leading and most widely sold lines in the field. Mr. Merritt observes that: "Twenty-five years ago, as packet seeds, bulbs, nursery stock, strawberry plants, etc. began to respond to merchandising methods, there began the 'small package' business in insecticides and fungicides. The products were progressively improved, supplemented, tailored to fit, packaged better, priced more attractively, and used more widely. Victory gardening and a wide range of new materials and methods as a result of war-stimulated developments, coupled with progressive and sometimes spectacular adaptation of known merchandising principles, cultivated the interest of the wealthiest population we have ever had and established an industry.

(*Turn to Page* 139)

Two new specialty products in the fertilizer field for the home gardener: "Bantus" is a combination conditioner-fertilizer marketed by Soil & Plant Foods, Inc., New York. "Planter Mix," an organic fertilizer and potting soil, employs a new type packaging which is gaining popularity in the home garden field, a gaily printed polyethylene bag. Produced and distributed by American Brand Fertilizer Co., Hobart, Ind. and Benson Maclean, Bridgeton, Ind.

High Analysis, Water Soluble PLANT FOOD FORMULATIONS

By P. G. Arvan and D. T. Mowry
Monsanto Chemical Co., St. Louis, Mo.

IN recent years considerable interest has arisen in the use of water-soluble, plant foods which are available in both solid and liquid formulations. Home gardeners and commercial growers, including farmers, have been purchasing these products in ever increasing quantities.

Formulations of this type are of particular interest to the home gardener because of the easy handling provided by the high analysis, the cleanliness and freedom from objectionable odors, and the ease with which they can be applied uniformly to lawns and flower and vegetable beds after dilution by automatic metering devices attached to garden hoses.

Similar formulations appeal to commercial growers as supplementary sources of the major nutrients at special periods during the growth of a crop. This practice includes the use of "starter" solutions during seeding or transplanting and the use of "booster" solutions at desirable intervals during subsequent growth. Rapid availability of predissolved nutrients makes such materials advantageous in "crisis" periods. Further, they may be incorporated into irrigation water during very dry weather or applied as foliar sprays during very wet weather. It is frequently convenient to use formulations that are compatible with herbicides, insecticides, and fungicides, thereby providing additional fertilization at no added application cost. Scattered data indicate that both the availability and the efficiency of nutrients in solution form are often superior to solid formulations made from ingredients such as superphosphates or mixed-goods formulas applied in conventional ways.

This presentation will summarize the materials and compositions of presently available formulations which find use in both the home garden and horticultural market. Factors affecting the choice of nutrient sources for the preparation of both solid, soluble formulations and liquid formulations are discussed. The same factors should be considered when purchasing and using these materials.

Analysis of Existing Home-Garden Formulations

TABLE I provides data on the analysis of twenty solid and six liquid formulations of home-garden products. Most of these have national distribution. Commercial-type formulations vary so widely with specific uses that significant generalizations cannot be made.

The total primary nutrient content provides an index of the degree of concentration. The mean percent total active is 50% for the solids and 25% for the liquid formulations. The nutrient distribution provides what is perhaps a more critical criterion for comparing various formulations. The nitrogen nutrient is the most expensive and normally a cost ratio of 4-2-1 is considered by many to be proper for the relative costs of N-P_2O_5-K_2O.

N-P_2O_5 base ratios which approximate 1-1 and 1-2 predominate and occur with about equal frequency. The N-P_2O_5-K_2O base ratio of 1-2-1 is the basis of one-third of the formulations examined and the 1-1-1 base ratio is found in about one-fifth of the formulations.

The principal nutrient sources in the formulations listed are:

Nitrogen: Monoammonium phosphate, diammonium phosphate, urea, ammonium sulfate, potassium nitrate

Phosphorus: Monoammonium phosphate, diammonium phosphate

Potash: Potassium nitrate, potassium chloride

Some observations can be made on the distribution of nitrogen types in the solid formulations. Sixty per cent do not contain any "organic" (urea) nitrogen. The nitrate-ammonium ion nitrogen distribution ranges from 80-20 to 20-80. Thirty per cent of the formulations contain sources of all three forms of nitrogen. The urea-nitrate-ammonium nitrogen distributions vary from 20-40-40 to 60-20-20.

Over eighty per cent of the solid formulations derived all of their P_2O_5 from monammonium and diammonium phosphates.

The pH of one percent solutions or suspensions covered the range of 2.3 to 7.9 with the large majority falling in the range of 4.9 to 7.9

The hygroscopicity (moisture pick-up) of solid formulations, determined at 50% relative humidity and 70°F. for 24 hours, varied from 0 to 15%, the majority being in the 0-7% range.

The acidity equivalent (acid-forming potential expressed in pounds $CaCO_3$ per ton of fertilizer) was listed for half the formulations. These ranged from —100 to +725. Most of the formulations lie in the range of +500 to +720.

Trace elements were specifically claimed and listed in only three of the solid formulations. Six others indicated trace-element content but did not make specific claims. Twenty per cent of the formulations claim supplementary "growth factors" such as naphthalene acetic acid or vitamin B_1.

Artificial coloring, usually a shade of green, was incorporated in over fifty per cent of the solid formulations.

Many of the solid formulations had insoluble residues when dissolved in water and diluted to the specified concentration for use. In cases where less than 10% of the formulation was water-insoluble at the use dilution, most of the insoluble portion was generally found to consist of insoluble phosphate salts of trace element metals. The insoluble portion in such cases contained over 75% of the trace element content of the formulation. This was also true in one case where claim was made for the presence of a solubilizing chelating agent. In products where the insoluble content was above 10% (some ranged up to 65%), the insoluble portions were found to consist primarily of calcium sulfate, calcium or magnesium silicates or dicalcium phosphate. Nitrogen or potash was never found in the insoluble portions. In only two of the products, where the P_2O_5 content was derived from superphosphate, was any appreciable quantity of the phosphate in water-insoluble form. The principal objections to the presence of water-insoluble fractions are (1) uneven distribution of primary nutrients and trace elements, and (2) the possibility of clogging spray and siphon equipment.

Measurement of surface tension of 0.25 to 1.0% water solutions indicated that a few formulations contained surface-active agents. Published data have indicated that such ingredients are desirable in foliar sprays to facilitate uniform coverage of the leaf by the nutrient solution. This enhances nutrient pick-up and reduces leaf burn. However, very few

TABLE I.
Analysis of Home-Garden Formulations

Commercial Formulation	Primary Nutrient Analysis	Total Primary Nutrient Content	Primary Nutrient Sources	Water Insol. Content At Recommended Dilution	Constituents Of Water Insoluble Portion
	(% N-P_2O_5-K_2O)	(%)		(%)	
			SOLID FORMULATIONS		
A[1][3]	19-28-14	61	$NH_4H_2PO_4$ Urea KNO_3	2.7	Fe, Ca, Zn, Cu, Mn, Phosphates
B	23-21-17	61	$NH_4H_2PO_4$ Urea KNO_3	0	
C	20-20-20	60	$NH_4H_2PO_4$ $(NH_4)_2HPO_4$ Urea KNO_3	0	
D	15-30-15	60	$NH_4H_2PO_4$ Urea, $NaNO_3$ KCl, KNO_3	0	
E	15-30-15	60	$NH_4H_2PO_4$ Urea, $NaNO_3$ KCl, KNO_3	0	
F	23-24-12	59	$NH_4H_2PO_4$ Urea KCl	0	
G	19-22-16	59	$NH_4H_2PO_4$ Urea KNO_3	0.1	Not Identified
H[3]	12-31-14	57	$NH_4H_2PO_4$ $(NH_4)_2SO_4$ KNO_3	0	
I	13-26-13	52	$NH_4H_2PO_4$ Urea, $NaNO_3$ KNO_3, KCl	4	Not Identified
J[2]	20-10-20	50	KH_2PO_4, KNO_3 $2\ MgSO_4 \cdot K_2SO_4$ Urea, $Ca(NO_3)_2$	2.2	Ca, Mg, Mn, Fe, Zn, Cu, Co, Mo Phosphates
K	13-17-20	50	$NH_4H_2PO_4$ $(NH_4)_2HPO_4$ $(NH_4)_2SO_4$ KCl	0	
L[1]	16-16-16	48	$NH_4H_2PO_4$ Urea KNO_3, KCl	1.8	Fe, Zn, Cu, Mn, Ca, Mg Phosphates
M[3]	11-15-20	46	$NH_4H_2PO_4$ $(NH_4)_2HPO_4$ KNO_3	16	Mg_2SiO_4, Inert Org. Matter

Commercial Formulation	Primary Nutrient Analysis	Total Primary Nutrient Content	Primary Nutrient Sources	Water Insol. Content At Recommended Dilution	Constituents Of Water Insoluble Portion
	(% N-P_2O_5-K_2O)	(%)		(%)	
N[2,4]	6-25-15	46	Superphosphate $NH_4H_2PO_4$ KNO_3	30	Ca_2SiO_4 ($CaSO_4$, $CaHPO_4$)
O	15-15-15	45	$NH_4H_2PO_4$ Urea K_2SO_4	10	Not Identified
P	18-16-16	40	$NH_4H_2PO_4$ $(NH_4)_2SO_4$ KNO_3	0	
Q	15-10-14	39	$(NH_4)_2HPO_4$ $(NH_4)_2SO_4$ KNO_3	0	
R	7-6-19	32	Superphosphate $(NH_4)_2SO_4$ KNO_3	37	$CaSO_4$ $CaHPO_4$
S[2]	8-16-7	31	$NH_4H_2PO_4$ $(NH_4)_2SO_4$ KCl	31	$CaSO_4$
T	5-8-7	20	$(NH_4)_2HPO_4$ KNO_3	65	Ca_2SiO_4 Mg_2SiO_4
			LIQUID FORMULATIONS		
A[2,4]	12-20-10	42	$(NH_4)_2HPO_4$ $(NH_4)_2SO_4$ KCl	0	
B	6-12-6	24	$Ca(H_2PO_4)_2 \cdot H_3PO_4$ $(NH_4)_2SO_4$ KCl	0	
C	6-9-7	22	KH_2PO_4 $(NH_4)_2SO_4$ KCl	0	
D	10-5-5	20	KH_2PO_4 Urea N from fish meal	0	
E[3]	5-10-5	20	Na_2HPO_4 $(NH_4)_2SO_4$ KCl, KH_2PO_4	0	
F	4-8-4	16	KH_2PO_4 $(NH_4)_2SO_4$	0	

(1) Trace elements—Mn, Fe, Cu, Zn, B and minor nutrients Ca and Mg, found present, although not specifically claimed on package label.
(2) Trace elements—Fe, Mn, Cu, Zn, Mo, Co, B—some or all claimed and listed on package label.
(3) Specifically claim Vitamin B.
(4) Specifically claim Naphthalene Acetic Acid.

formulations contained enough surfactant to provide such benefits.

Principles for Preparing Formulations

There appears to be a trend in recently introduced formulations toward a N-P_2O_5-K_2O base ratio of 1-1-1 for all-purpose horticultural formulations having national distribution. Commercial-type formulations, however, may be very high in P_2O_5 for "starter" use, high in nitrogen for "booster" use on crops such as tomatoes or corn, or high in potash for other crops such as tobacco.

Attention should be directed to the minimum guaranteed analysis (rather than the theoretical analysis of pure compound) of purchased ingredients when making formulations. Typical guaranteed analyses are listed below for commonly used nutrient sources:

Nutrient Source	Minimum Guaranteed Analyses		
	Nitrogen (%N)	Phosphoric Anhydride (%P_2O_5)	Potash (%K_2O)
Urea	46	0	0
Sodium nitrate	16	0	0
Ammonium nitrate	33.5	0	0
Ammonium sulfate	20	0	0
Potassium nitrate	13.7	0	46
Monoammonium phosphate	12.2	61.6	0
Diammonium phosphate	21	53.8	0
Monopotassium phosphate	0	51.6	34.2
Dipotassium phosphate	0	40	53
Potassium chloride	0	0	62

Nutrient ingredients should be chosen with an eye toward the highest purity and highest analysis that is consistent with reasonable cost. Inert components such as chloride and sodium ions contribute little and may be detrimental.

Mutual incompatibility of compounds can result in objectionable odors and even in loss of gaseous ammonia. Incompatible ingredients may cause insoluble precipitates in the solutions prior to use. High solubility (over 30%) of the formulation in water is essential for use in metering or siphon devices. Rapid dissolution of the solid in water is a great convenience to all users. The pH of either solid or liquid formulations can be an important factor in the corrosion of packages and application equipment.

The type of nitrogen source merits careful consideration. Formulations which may be applied to the soil in cold or wet weather should contain some nitrate to provide initial response until soil conditions are favorable for nitrification. Ammonium nitrogen, urea and other soluble organic nitrogen sources should be considered essentially equivalent with respect to rate of availability through nitrification. Appropriate

(*Turn to Page* 137)

Studies* of

D D T Residues

on corn

THE use of DDT sprays and dusts for control of the European corn borer, *Pyrausta nubilalis* (Hbn.), has proved to be practical and economical on both field and canning corn. The possible contamination of corn silage and stover, intended for cattle feeding, by DDT residues has retarded the acceptance of this insecticide, and has made it desirable to investigate the magnitude of residues retained on the corn plants after recommended treatments for borer control. In addition to this practical aspect, the nature of residues remaining after the application of various formulations of DDT with different types of equipment were studied in an effort to improve control techniques.

The literature contains only limited references to insecticide residues on corn plants. Decker *et al.* (1947) reported DDT residues varying from 14.9 p.p.m. obtained with DDT dusts to 117.3 p.p.m. obtained with oil solutions. Apple and Decker (1949) reported that parathion residues of 6.8 p.p.m. two days after the application of a 2 per cent parathion dust decreased to 0.7 p.p.m. 21 days later. Anderson and Hashe (1949) reported residues of from 3.0 to 137 p.p.m. of DDT on husks and silk or tip of ears of corn treated for corn earworm control. Ginsburg *et al.* (1950) reported the presence of parathion, DDT, and TDE on corn plants resulting from the application of five insecticide dusts.

Corn plant dissected for study of residue distribution on plant parts: *a*, Stalk; *b*, whorl; *c*, leaf base; *d*, leaf tip.

Bacon (1950) and Ginsburg and Filmer (1951) reported appreciable DDT residues on the husks and silks of corn ears treated for corn earworm control. Hawkins (1951) compared the residues left on corn plants by four sprays made at five-day intervals to show that the early applications left less residue than late applications. Anderson *et al.* (1951), in the study of DDT dusts, sprays, and injection treatments for control of the corn earworm, showed that significant amounts of DDT were not found on the edible portion of the ear, but that husk and silk refuse of treated ears contained from 46 to 208 ppm of DDT. Ginsburg *et al.* (1952) found no malathion residues on corn plants 21 days after spray application.

Investigations of the magnitude and fate of DDT residues on corn plants sprayed for European corn borer control were conducted as a cooperative project between the Entomology Branch and Iowa Agricultural Experiment Station. These investigations were furthered by a grant-in-aid received from the Geigy Co. Inc., New York, in 1950 and 1951. During these investigations approximately 7,000 samples of corn plants and plant parts were analyzed for DDT residues.

Experimental Procedure

The experimental spraying of corn plants with DDT for residue analyses was conducted on corn plants in fields that had been fertilized and cultivated in accordance with recognized commercial practices. Ground applications of sprays and dusts were made with commercial high-clearance machines. Aerial applications were made with a Piper Cub plane equipped for both spray and dust treatments.

The method of sampling the corn plants was uniform throughout the study. The person taking the sample would walk 5 to 10 paces into the row, take the nearest plant regardless of condition, and would collect additional plants at 5- to 10-pace intervals until the sample was completed. Spray treatments were replicated four to six times, and separate samples of 5 or 10 plants were collected from each replicate for residue analysis. Samples weighing more than 1000 grams could not be processed in equipment available, so that it was necessary to take aliquots of the sample for residue analysis. In

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By Jack E. Fahey
T. A. Brendley
and
H. W. Rush[**]

USDA, Agricultural Research Service
Entomology Branch
Vincennes, Ind.

Applying insecticide formulation to corn plants approximately 50 inches in extended height.

order to obtain aliquots representative of entire samples, the corn plants were cut with a slicer or silage chopper into about 1-inch lengths. The chopped plants were then mixed and a weighed aliquot of approximately a pound was taken for analysis. In the study of distribution of residues on plant parts, the plants were dissected to separate the leaf tips, leaf bases, whorl, and stalk as shown on opposite page.

Analyses reported in this paper were made by the organic chlorine method of Wichmann *et al.* (1946) and the Stiff-Castillo (1945) method.

Effect of Variables on Residues

A review of the literature has failed to show any reference to the effect of spray volume, pressure, or nozzle arrangement on the magnitude and distribution of insecticide residues on corn plants. Since insect control depends upon these factors, experiments were conducted to show their effect when DDT was applied to corn for corn borer control.

Spray-Volume Studies

The volume of spray material applied per acre may affect both the magnitude and the distribution of insecticides on plants. If volumes are inadequate, distribution may be poor, but if they are excessive, there may be a heavy run-off which would reduce the magnitude of residues. The availability of water and the time employed in filling the sprayer are economic factors which must be considered in the choice of volume of spray to be employed.

Study of the effect of spray dilution on the distribution and retention of DDT was made on field corn plots in 1951. Six spray treatments employing 1.5 pounds of technical DDT (3 quarts of 25- per cent emulsifiable concentrate), at a pressure of 40 p.s.i. in dilutions varying from 2.5 to 80 gallons of spray per acre were compared. Each spray treatment was replicated six times. Samples for residue analyses consisted of five-plant subsamples, one from each replicate. After the samples had been collected in the field, they were taken to the laboratory and dissected into the four parts. These parts were analyzed separately and the total plant residue was obtained from the sum of the residues on the plant parts.

The maximum residues on the leaf tips, leaf bases, whorl, and whole plant were obtained from the minimum spray volume, 2.5 gallons per acre. When the volume was increased to 5 gallons per acre, there was an appreciable drop in the residues on the leaf tips, whorl, and total plant, an indication that some excessive wetting of these parts had caused a run-off and increased the residue on the leaf bases. When the volume was increased to 10 gallons per acre there was a further decrease in the whole plant residue because of further loss of residue from the leaf tips and whorl. At 20 and 40 gallons of spray per acre the total plant residue did not differ appreciably from that at 10 gallons; however, there was a decrease in the residue on the plant leaves and an increase on the whorl and stalk. The minimum residue on the entire plant was obtained at the maximum spray volume, 80 gallons per acre. At this volume minimum residues were on the tips and bases but increased residues were on the whorl and stalk, indicating excessive wetting of the entire plant.

Spray-Pressure Studies

To study the effect of spray pressure on the magnitude and distribution of DDT deposits, plots of field corn were treated with 1.5 pounds of technical DDT in 10 gallons of water per acre applied at pressures varying from 20 to 160 p.s.i. Each treatment was replicated six times, samples were collected, dissected, and the parts analyzed separately as in the spray volume study.

The maximum residue on the entire plant was obtained at the minimum pressure, 20 p.s.i. There was no appreciable difference in residue load or distribution at spray pressures of 40, 80, and 160 p.s.i.

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*"SEQUESTRENE" is the brand name for chelating compounds produced by Alrose Chemical Company, a Geigy Company. Geigy Company, Inc., Insecticide Division, has exclusive sales agency for Sequestrene metal complexes in the agricultural field.

Nozzle-Arrangement Studies

Machines employed for the application of insecticides to corn plants have various nozzles and nozzle arrangements. They control the pattern of the spray application and are therefore critical factors in the deposition and distribution of insecticides on corn plants.

A study of the effect of nozzle arrangements on the deposition and retention of DDT was conducted on field corn. In spray treatments 1.5 pounds of technical DDT in 10 gallons of water per acre was applied at 40 p.s.i. Six nozzle arrangements were compared. The procedure used in collecting and analyzing the samples was the same as in the two previous tests.

A single hollow-cone nozzle gave the smallest residue on the entire plant and in the whorl. A single 80-degree fan nozzle and an arrangement of two 65-degree fans side by side increased the plant residue only slightly over that obtained with the hollow-cone nozzle. However, these nozzles gave 3.3 and 2.3 times as great a residue in the plant whorl as did the single hollow cone. Two 80-degree fans in tandem gave only slightly greater residues than were obtained with a single 80-degree fan. An arrangement of three 65-degree fans side by side materially increased the residue on the leaf tips and left the maximum residue of the nozzles studied. The Iowa State arrangement, one 65-degree fan over the row and one 65-degree fan on each side of the row, materially increased the residue on the leaf bases over that obtained with other nozzle arrangements.

Formulation Effect on Residues

THE physical characteristics of insecticide dusts and sprays may be expected to affect the magnitude, distribution, and persistence of insecticide residues on plants. Experiments designed to study the effect of formulation on these factors were conducted in a field of 4297 hybrid corn. Three DDT formulations—a 10-per cent dust, a 50-per cent wettable powder, and a 25-per cent emulsifiable concentrate—were compared. The dust was applied at two pounds and the sprays at 1.5 pounds of technical DDT per acre at a spray pressure of 40 p.s.i. Three pounds of the wettable powder was added to 20 gallons of water for the suspension spray and three quarts of the emulsifiable concentrate in 10 gallons of water for the emulsion spray.

Three replicates of each treatment were made at night, when a heavy dew was present on the plants, and the other three replicates during the day. The treatments were applied on June 26 and July 9. The corn was approximately 44 inches in extended height at the time of the first application. Samples for residue analysis were collected as soon as the spray had dried and at various times from one to 48 days after the second application. A 10-plant sample from each replicate was dissected into four plant parts and each part analyzed separately.

Results of tests made after the second spray application indicated that the residue from DDT dusted at night when the plants were wet with dew was nearly twice as great as that on similar plants dusted during the day when they were dry. There were no appreciable differences in the initial residues from day and night applications of suspension and emulsion sprays. However, samples taken one day after the spraying showed appreciably greater residue from the emulsion than from the suspension.

The residue from the DDT dust persisted at a higher level than that from the suspension spray, when evaluated in per cent retention. The residue from the emulsion spray was the most persistent.

An analysis was made of the distribution of DDT (average of 6 replicates, 3 day and 3 night) on the plant parts from the three formulations as well as the percentage of total plant weight represented by the plant parts. With the samples taken up to 16 days after the spraying, the percentage of the total plant represented by the leaf tips and leaf bases was relatively consistent in all plots. Between 16 and 48 days after the spraying, as the plant approached maturity, the percentage of total plant weight represented by the leaf tips declined sharply, but that represented by the leaf bases showed little change. The whorl of the plant decreased in percentage of total plant weight during the period of study, and after 48 days became part of the plant stalk. The percentage of total plant represented by the plant stalk was always greater than the sum of the percentages represented by the other parts, and increased regularly up to 48 days after the spray application.

In the initial samples the percentage of the total residue was higher on the leaf bases and lower on the leaf tips in the dusted plot than in the two sprayed plots. The whorl and stalk samples contained approximately the same percentage of total deposit regardless of the formulation used. In the dusted plot the leaf-tip residue showed a constant decline in the percentage of the total residue. The residue on the leaf bases remained nearly constant, whereas that on the whorl and plant stalk increased. With the suspension spray there was a slower loss in the percentage of total residue from the leaf tips, but an increase of 14 to 23 per cent on the leaf bases; the stalk also showed an increase in percentage through the weathering period. From the emulsion spray the percentage of total residue on the leaf tips remained almost constant, but the percentage on the leaf bases increased with weathering. In the percentage of total residue, the plant whorl showed a decrease approximately equal to the decrease in the percentage of total weight of the whorl, and the plant stalk showed only a small increase compared with that on the stalks of plants dusted or sprayed with the wettable-powder formulation.

Plant Growth Relation to Residue

DDT has been recommended for the control of European corn borers on both field and canning corn. The criteria for need of sprays vary between States in the Corn Belt, and may include the number of egg masses per 100 plants, the amount of leaf feeding, and time-temperature

(*Continued on Page 135*)

Canadian Agricultural Chemicals Association

HOLDS FIRST ANNUAL MEETING IN TORONTO

ARTHUR CARTER SUCCEEDS J. H. D. ROSS AS PRESIDENT

MORE than two hundred representatives of U. S. and Canadian manufacturers of agricultural chemicals products attended the first annual conference of the recently formed Canadian Agricultural Chemicals Association, held February 19th at the Royal York Hotel, Toronto, Ontario. Arthur H. Carter, Green Cross Products, Sherwin Williams Co. of Canada Ltd., Montreal, was elected president, succeeding J. H. D. Ross, Canadian Industries Ltd., Montreal, whose term began when the group was first organized in June, 1953.

Other officers elected are: first vice president, M. F. Anderson, Naugatuck Chemical Co., Montreal; second vice-president, W. R. Geddes, North American Cyanamid Co., Torronto; secretary, R. G. Smith, Charles Albert Smith Ltd., Toronto; treasurer, K. B. Owens, Monsanto (Canada) Ltd., Montreal; Directors: R. M. Ferguson, Dow Chemical of Canada, Ltd., Regina, G. E. Willan, Niagara Brand Spray Co. Ltd., Burlington, and J. H. D. Ross, Canadian Industries Ltd., Montreal.

The one day meeting included several reports and papers dealing with insect problems, seed treatment, an education program, and merchandising. A. W. A. Henry, University of Alberta, Edmonton, Alta., discussed the role of chemical treatment in the production of Canada's major grain crops, and indicated that seed treatment could be classified as seed disinfestation, and seed protection. He reported that the organic mercurials are the chemicals most widely employed and most commonly recommended at present for seed treatment of small grains; that in spite of their poisonous character, they are being used in the treatment of about 58% of the seed of wheat, oats and barley sown in Alberta. He indicated also that though treatment with formalin has been discouraged for some years, it is still used quite extensively in Alberta, since it gives good control of covered smut diseases; it is not effective as a seed protectant, and often causes serious seed injury, especially when used on hull-less grains.

New officers and 1954 executive board: treasurer, K. B. Owens, Monsanto (Canada) Ltd., Montreal; secretary, R. G. Smith, Charles Albert Smith Ltd., Toronto; G. E. Willan, Niagara Brand Spray Co., Ltd., Burlington, Ontario; president, Arthur H. Carter, Sherwin-Williams of Canada, Montreal; R. M. Ferguson, Dow Chemical of Canada, Regina; retiring president, J. H. D. Ross, Canadian Industries, Ltd., Montreal; 1st vice-president, M. F. Anderson, Naugatuck Chemical Co., Montreal; and J. D. Ruttan, Chipman Chemicals Ltd., Winnipeg. Not in picture, second vice-president, W. R. Geddes, North American Cyanamid Co., Toronto.

PAUL Mayfield, general manager of the naval stores department of Hercules Powder Co., Wilmington, and president of the National Agricultural Chemicals Association, reviewed for the members of the newly formed Canadian association the program and operation of N.A.C.A., its counterpart in the United States. He emphasized that in the agricultural chemical field, particularly, "there is a greater need for a strong and well-run trade association than in some other fields." This is true, he observed, because "in the case of agricultural chemicals, a great responsibility both legally and morally rests upon the manufacturer not only to produce a good pesticide and to merchandise it properly, but also to educate the dealer, or the person who distributes the material, the grower who makes use of the mater-

Left: K. W. Neatby, Canada Department of Agriculture; Center: Paul Mayfield, Hercules Powder Co., Wilmington, and president of N.A.C.; Right: Wallace Murdock, Ford Tractor and Equipment Sales Co. of Canada, Ltd.

ial to protect his crops, the government and state agricultural workers who, to a large extent, must endorse the use of the materials, the various technical groups interested in pest control, such as the entomologists, the pathologists, the agronomists, the medical profession, the man who handles the material so he can avoid personal injury, and finally, the public in general."

He indicated his strong feeling that no trade association should ever be put in the dangerous position of attempting to secure favors for its members, or attempting to solve the individual problems of a member company, but he added that what a trade association can and should do is to "create a favorable atmosphere for the industry as a whole, in which individual competition has free play."

Reviewing some of the various ways in which N.A.C.A. has sought to aid its members, Mr. Mayfield commented that "NAC today finds itself more and more concerned with the task of combatting a great deal of misinformation, downright exaggeration, and pseudoscientific double talk that will—unless checked—make the American public unjustifiably afraid of pesticides.

"This is a public relations problem which has grown in magnitude during the last few years. Compared with the initial public reaction to such modern improvements as the automobile, or anaesthesia, or pasteurized milk, the pesticide industry introduced its products without arousing any suspicion or antagonism. As the years went by, tremendous progress was made through research. But we neglected consumer education, public education, the art of salesmanship, and the problems of distribution, credits, and other commercial and economic principles. Now we find that some of these questions are waiting to be answered. This is particularly true in the field of consumer and public education."

The N.A.C.A., Mr. Mayfield pointed out, maintains an information committee, and an information advisory committee, in an attempt to get across to the general public the story of the real truth behind modern insecticides and their use. A speakers' manual on insecticides is another service offered through the association, press conferences are held regularly and authentic information on pesticides and their use is made available through the N.A.C.A. to the press and to agricultural leaders.

A by-product in the U. S. of the "scare stories" in connection with pesticide use has been a sizeable increase in the number of bills introduced into our legislatures further to control pesticide use, Mr. Mayfield told his Canadian listeners. This has created additional work for N.A.C.A.'s legislative committee, which, he indicated cooperates closely with state and federal enforcement officials.

"Every effort is being made to support sound legislation in the form of model bills, but at the same time, vigorously protecting the industry so as to permit a continuation of research, promotion and increased use. As a part of our legislative program, we issue a law guide which covers an analysis of all the state and federal laws. This is kept up to date currently. As far as we know, this is the only complete summary covering interpretations, regulations, and legislation available on this phase of pesticide legislation."

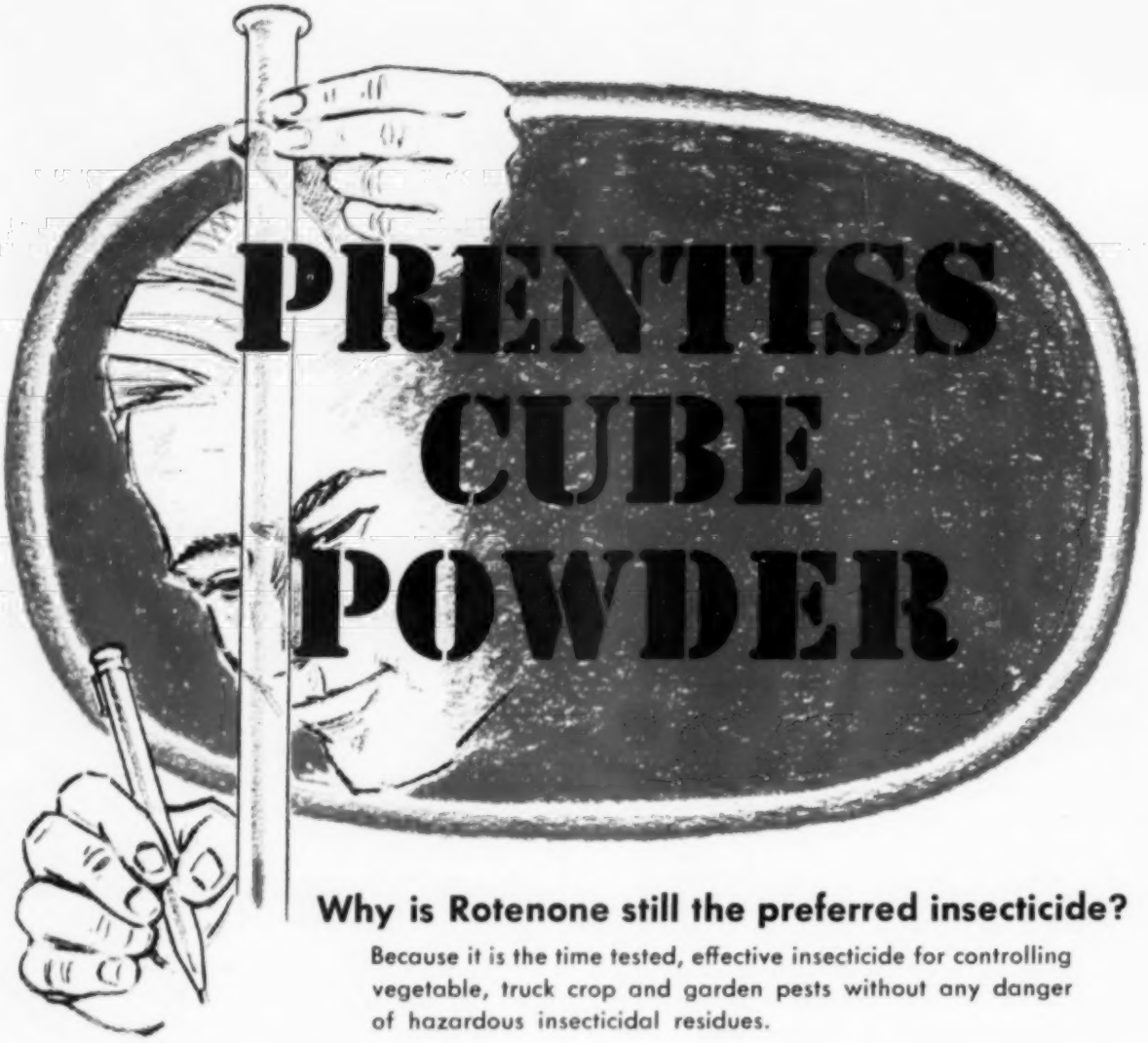
Closely allied with these problems of public relations and legislation, the speaker also observed, is the question of product liability. To help combat this serious threat to the industry, N.A.C.A. has made available to members a limited consultant service with the association's counsel. Efforts are also under way to try to obtain sound liability insurance for the industry at reasonable rates.

Mr. Mayfield also reviewed the work of the N.A.C.A. traffic committee, observing that through the efforts of this committee in obtaining a sound basic classification, ratings and tariff, substanial savings have accrued to members which in many cases have paid the cost of annual dues many times over.

IN discussing Canada's major seed control problem, H. E. Wood, Manitoba Dept. of Agriculture, Winnipeg, Man., reviewed weed damage, tillage, and soil sterilants. He indicated that CUM, Dalapon, IPC and maleic hydrazide are still being tested; that 2,4-D is used on prairies, is ineffective on grass-type weeds; that MPC is preferred for crops such as oats, flax, and legumes; and that TCA is proving effective in flax and peas to eradicate foxtails.

Wallace Murdoch, Ford Tractor and Equipment Sales Co. of Canada Ltd., stressed to the conference the importance of merchandising plans directed to the farmer, and factors to consider in selecting and training salesmen. A. C. Petter, Canadian Paint Varnish and Lacquer Association reviewed the "Importance of Good Public Relations to an Industry."

(*Turn to Page* 149)



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Results of 1953

FUNGICIDE TESTS

Completing the summary of reports on fungicide tests by 75 collaborating pathologists who have cooperated by mailing reports of their work and their findings during the 1953 season to a committee of the American Phytopathological Society. This special Advisory Committee on Collecting and Disseminating Data on New Fungicide Tests, of which Dr. L. G. Utter, Diamond Alkali Co., Newark, N. J. is chairman, has made arrangements for reprinting the complete report which may now be ordered at $1.00 per copy, through Dr. W. D. Mill, Dept. Plant Pathology, College of Agriculture, Ithaca, N. Y. Test results were assembled and summarized by Dr. A. G. Newhall of the New York State Agr. Experiment Station, at Cornell University, Ithaca, N. Y.

Seed Treatments

Cotton

Seed rot. San Joaquin Valley, California. W. D. McClellen. Field test. Seeds of variety Acala 4-42 were either dipped in Panogen at 1½ oz. per 100 lbs. of seed or mixed with a slurry of Ceresan M at 2 oz. per 100.

"In 1952, in five out of six tests, on three soil types, Panogen gave better emergence and higher percentages of disease free seedlings. In 1953, of fourteen comparisons between these two materials all gave better stands with Panogen." Moreover, "Growers prefer the red color and applicators find it easier to use."

Forage Crops

Damping off and seedling diseases. Moscow, Idaho. J. M. Raeder. Fungicides were tested on Manchar Smooth Brome Grass, Ranger Alfalfa, Alta Fescue, Keland Red Clover, and Ladino Clover at 5 field stations in 1952. Dust was applied to the seed at 8 ounces per 100 lbs. Treatments replicated 5 times and randomized for each species. Results in 1952 based on stand counts were inconclusive for Spergon, Arasan and New Improved Ceresan. Results for 1953 not yet available.

Vegetables

Damping off. In a replicated test of 7 fungicides for improved emergence conducted in the field at Ottawa, Canada, by V. R. Wallen, the following tables indicate statistically valid results and preferences for each vegetable. All dosage rates are in ounces per 100 lbs. of seed, except Merculine, Mercusol, Panogen, and Vancide which are in fluid oz.

Swiss Chard

Materials listed in order of disease control and over-all preference.

			DC	OP
Merculine	4 oz.		1	1
Vancide 51	32 oz.		2	2
Phygon	4 oz.		3	3
Panogen	4 oz.		4	4
Arasan	8 oz.	N.S.D.		
Mercusol	4 oz.	"		
Spergon	16 oz.	"		

Detroit Dark Red Beet

			DC	OP
Vancide 51	32 oz.		1	1
Phygon	8 oz.		2	2
Panogen	4 oz.		3	3
Merculine	4 oz.		4	4
Arasan	8 oz.		N.S.D.	
Mercusol	4 oz.		"	
Spergon	16 oz.		"	

Carrot

Only Vancide at 16 fl. oz. gave a significant difference in emergence of carrots.

Blackeye Soybean

		DC	PS	OP
Vancide 51	8 oz.	1	1	1
Panogen	4 oz.	2	2	2
Arasan	2 oz.	3	3	3
Phygon	1½ oz.	4	4	4
Merculine	4 oz.	5	5	5
Spergon	3 oz.	6	6	6
Mercusol	4 oz.	7	7	7

Green Seeded Citron

Fungicides are listed in order of disease control and over-all preference.

		DC
Spergon	6 oz.	1
Phygon	4 oz.	2
Merculine	4 oz.	3
Arasan	2 oz.	4
Panogen	4 oz.	5
Mercusol	4 oz.	6
Vancide	8 oz.	7

Sweet-Banting Corn

Materials listed as before.

		DC	OP
Vancide 51	8 oz.	1	1
Panogen	4 oz.	2	2
Phygon	1½ oz.	3	3
Arasan	2 oz.	4	4
Merculine	4 oz.	N.S.D.	
Mercusol	4 oz.	"	
Spergon	3 oz.	"	

Bountiful Bushbean

Only Phygon at 2 oz. and Vancide at 8 oz. per 100 lbs. gave significant increases in emergence of bushbean.

DC Degree of Control.
PS Plant Safety.
OP Operators Preference.
Y Yield.

Delcrow Cucumber

Materials listed as before.

	DC	OP
Arasan	1	1
Phygon	2	2
Panogen	3	3
Spergon	4	4
Merculine	5	5
Vancide 51	6	6
Mercusol	N.S.D.	

Mammoth Dill

The only treatments giving significant increases in emergence were Phygon at 8 oz. and Panogen at 4 fl. oz. per 100 lbs.

Hale's Best Muskmelon

The only significant increases in emergence were obtained with Spergon at 6 oz. and Phygon at 3 oz.

Champion Moss Curled Parsley

The only significant increase in emergence was obtained with Panogen at 4 fl. oz.

Sugar Pumpkin

Materials listed as before.

		DC	OP
Panogen	4 oz.	1	1
Merculine	4 oz.	2	2
Phygon	4 oz.	3	3
Arasan	2 oz.	4	4
Mercusol	4 oz.	N.S.D.	
Spergon	3 oz.	N.S.D.	
Vancide 51	8 oz.	N.S.D.	

Kitchonette Squash

Materials listed as before.

			DC
Merculine	2 oz.		1
Panogen	4 oz.		2
Phygon	4 oz.		3
Arasan	2 oz.		4
Spergon	6 oz.		5
Mercusol	4 oz.	N.S.D.	
Vancide	8 oz.	"	

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Bloomsdale Longstanding Spinach

The only significant increases in emergence were obtained with Vancide 51 at 16 oz. and Phygon at 4 oz.

Long Green Trailing Vegetable Marrow

Fungicides listed as before.

Phygon	4 oz.		1
Panogen	4 oz.		2
Merculine	4 oz.		3
Arasan	2 oz.		4
Spergon	6 oz.		5
Mercusol	4 oz.	N.S.D.	
Vancide 51	8 oz.	"	

Soil Treatments

Lima Bean (Fordhook)

Root rot *(Rhizoctonia)*. Riverside, California. J. B. Kendrick, Jr. In a comparison between a soil fumigant CBP-55 in liquid form and a fungicide dust M 275 applied in the furrow at time of seeding, the liquid fumigant was found to retard germination slightly and was believed unsatisfactory, while the dust at rates higher than 5 lbs. per acre in rows 30 inches apart retarded and reduced germination in direct proportion to the increased dosage. Mathieson #275 at 4.6 lbs. received over-all preference.

	Amt./Acre-row	DC	PS
CBP-55	0.67 gal.	2	3
Mathieson 275	4.6 lbs.		1
Mathieson 275	8.7 lbs.		2
Mathieson 275	15.7 lbs.	1	4
Mathieson 275	24.8 lbs.		5

Cucumber (Palmetto)

Damping off *(Pythium)*. Charleston, South Carolina. William M. Epps. In field plots 4 Mathieson experimental fungicides were dusted, at 25 and 50 lbs. per acre, into the furrow, once at planting time just before seeds were covered. Damping off was severe due mostly to *P. splendens*. None of the materials seemed worth further testing for this disease, all caused injury varying from slight with 275, to severe with 273 and 1197.

	% dust	PS	Y
275	20	1	1
276	20	2	2
1197	10	3	3
237	10	4	4

Tobacco

Root Knot and Meadow Nematode *(Meloidogyne Pratylenchus sp)*. T. W. Graham, Pee Dee Experiment Station, Florence, South Carolina. One application a few days before transplanting.

"Preliminary trials show VC 1-13 (Virginia-Carolina Chem. Co.) a neutral ester of phosphorothioic acid as a promising soil nematocide deserving further testing. Applications made in open furrows and covered with turning plow furrows. Rate 23 gallons per acre. Disease index for root knot 9.0 and meadow nematode root rot 24.0 Respective readings on control plots were 17.0 and 32.0. No toxicity to tobacco when transplanted 5 days after treatment.

PP 1353 (Penn Salt Company) liquid applied in holes 8 inches deep and 12 inches apart in bedded tobacco rows at approximately 5 gallons per acre. It gave root knot Disease Index of 12.0, root rot Disease Index of 10.0, while control plots were respectively 35.0 and 52.0. No toxicity to tobacco when transplanted 3 days after treatment.

N 521 (Stauffer) (3,5 dimethyltetrahydro- 1,3,5,2H-thiadiazine-2-thione) was used in tobacco plant beds to control root knot. Applications were made (1) as a surface drench, and (2) as dry material dug in 4 to 6 inches, both at rates of 40 pounds active per acre. In both methods of application root knot D.I. was 0.0 as compared with D.I. of 22.0 in controls.

Snapdragon

Root rot *(Thielaviopsis basicola)* control by single soil treatment, by C. E. Williamson, Farmingdale, New York, in greenhouse benches and flats.

"C.B.P. less noxious to use than chloropicrin gives some weed control without cover and excellent weed control if sealed in with Sisalkraft paper. This fungicide reduces germination of snapdragon seed—similar to methyl bromide. Brassicol and Compound 275 are not effective fungicides when mixed in infested soil, as far as *Thielaviopsis basicola* is concerned, and no further testing of these pentachlornitrobenzenes is warranted."

	Treatments	DC	PS	Y	OP
Steam	100° F/for ½ hr.	1	2	1	2
Methyl bromide	4#/100 sq. ft.	1	4	2	5
Chloropicrin	700#/acre	1	2	1	3
Formaldehyde	1-50 at 435 g./acre	1	1	1	1
Chlorobromopropene	(30 g./acre (60 g./acre	1	3	2	4
Brassicol	150# actual/acre	3	5	3	6
Compound 275	150# actual/acre	4	6	4	7
Untreated		2			

Soil Fumigation

Peanut (Dixie Runner)

Collar rot. Headland, Ala. J. A. Lyle. Fumigant applied two weeks prior to planting. Materials listed in the order of preference and yield. Last two caused plant injury.

		DC	PS	Y	OP
Dowfume W85	4½ g. Broadcast	1	1	1	1
Dowfume W85	2. g. in the Row	2	1	2	2
Dowfume W85	9 g. Broadcast	3	1	3	3
Dowfume W85	4 g. in the Row	4	1	4	4
CBP—55	2 g./100 sq. yd.	4	1	5	5
Mathieson 275	500 lbs./acre	4	1	6	6
Vancide 51	6 g./acre	4	1	7	7
Untreated Check					
Stauffer N—521	200 lbs./acre	9	10	9	9
Stauffer N—521	400 lbs./acre	9	10	10	9

Potatoes

Wilt *(Verticillium)*. Idaho. J. W. Guthrie made a comparison of Shell CBP-55, and P-162 against Chloropicrin (Larvacide) with hand injector in the field at soil temperature of 50°F., but reports no significant control with CBP-55 at 31 gallons per acre, or P-162 at 24 gallons. The latter was "highly phytotoxic," and the former "toxic to operator." Larvicide "too expensive for control program."

Tomato (Clark's Early)

Verticillium wilt. Summerland, British Columbia. G. E. Woolliams. Experiments conducted on small field plots, single applications, comparing one liquid injected with two dusts mixed with the soil. The two dusts, though not phyto toxic, were considered not worth further trial. At 90 gallons CBP-55, applied one week before planting, caused severe injury. Control was obtained with CBP-55 at 60 and 90, but not 30, gallons per acre applied 2 weeks before planting. The dusts caused no injury. Over-all preference is for CBP-55.

CBP-55	30, 60 and 90 Imp. gal.
NP-1083	35, 70 and 100 lb.
N-521	35, 70 and 100 lb.

Citrus Diseases

Lemon

Brown Rot *(Phytophthora)*. E. C. Calavan, T. A. DeWolfe, L. J. Klotz, at Riverside, California, compared the following fungicides in field and laboratory. One application was made in November with high pressure sprayer at the rate of 10 gallons per tree. Fruit samples collected from sprayed plots were subsequently inoculated and incubated to evaluate fungicidal applications, which are here listed in order of disease control.

	lbs./100 gal.	DC	PS	OP
22% Cu Bordeaux + S-20 spreader	5¼	1	9	6
Robertson Fungicide	1-2/3	1	9	6
Zinc Coposil	2	2	8	6
Copper A + lime + Dupont 88	1.5-1.5-⅛	3	3	2
Robertson Fungicide	2/3	3	8	7
$ZnSO_4 .7H_2O$ + $CuSO_4$ $.5H_2O$ + lime	5-1-4	3	2	1
Crag 640	2	3	6	5
Copper A + lime + Dupont 88	1.5-4⅛	4	2	2
Orthocide 406 (B-8-83)	2	4	1	1
COCS + lime	2-4	4	5	3
22% Copper Bordeaux				
Neutro Cop 53 + lime	1.5	5	6	7
Copper A + Dupont 88	1-2	6	2	4
Zinc Coposil + lime				
Zinc (20%) Copper (4%)-Fungorex + lt.-med. oil emul. + S-20 spreader	1.5-⅛ 2-3 8-1 qt.-⅜	7 8	7 3 2	8 6 6
COCS	2	9	8	10
Neutro Cop	1	10	6	9
Crag 658	2	11	5	9
Bordeaux	1-1	12	4	9

Orange and Grape Fruit

Septoria Spot. L. J. Klotz compared the following fungicides in field experiments in Tulare County, California. Materials were applied at 2100 gallons per acre. No apparent injury nor effect on yield was observed. Over-all preference was for Z-78 and homemade Bordeaux.

		DC
Z 78 + B1956	2-1 oz.-100	1
Bordeaux + S 20 Spreader		
Leffingwells A1-Cu-Fe + S-20 + Citrofo Oil 60X	2-2 -4 oz.-100	1
Homemade Zinc Sulfate + Copper Sulfate + hydr. lime + S-20	8-4 oz.-1½ pts. 5-2-20 + 4 oz.	1 2
Copper A + S-20	1⅛- 4 oz.	3
Lambert & Bream "Commercial Bordeaux"	2-10-100	3
C & C 658 + S-20	1 11/16-4 oz.	4
Captan (50% wettable)	2-100	5

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Insecticides should be bought, like any other commodity, on a basis of results, not cost per gallon. Piperonyl Butoxide, the superior synergist, gives greater killing power and greater effectiveness with pyrethrins.

The U.S.I. combination of pyrethrin extract and Piperonyl Butoxide is called Pyrenone* insecticide, a registered trade mark of U.S.I. U.S.I. has research findings available to its customers that prove the effectiveness of Pyrenone. Before attempting to substitute another synergist for Piperonyl Butoxide, check the research findings. Be sure the insecticides you use and sell contain the effective synergist, Piperonyl Butoxide.

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NUT TREES

Pecans

Scab *(Cladosporium effusum)*. Georgia and Florida. John R. Cole. In field tests with hydraulic, speed sprayer, and concentrate mist blower, two pre-pollination sprays in April followed by post-pollination sprays in May, June, July and August, for a total of 6 applications were made. Bordeaux, Zerlate and Dithane Z-78 all gave commercial control with hydraulic and speed sprayers. Bordeaux gave the best control with 3X concentration. Poor control was obtained with Vancide 51ZW. Other tests begun in July not conclusive.

Walnut

Bacteriosis. In a field test of 5 fungicides at Corvallis, Oregon, by Paul W. Miller, 3 applications were made at (1) early pre-bloom, (2) late pre-bloom, (3) early post-bloom, with power sprayer. Manzate was "not worth further trial" at 1¼ lbs.

	lbs./100 gal.	DC	PS	OP
Copper A Compound	2	2	1	1
Yellow cuprocide	1	2	3	2
Bordeaux mixture	4-2	1	5	3
Mercusan	1 qt.	3	4	4
Manzate	1¼	4	2	5

Ornamentals

Aster (Rust), **Carnation** (Blight), **Iris** (Leaf spot), **Snapdragon** (Rust). Results of weekly spray applications at Ithaca, New York, on small replicated plots conducted by M. N. Rogers, J. P. Ross, and A. W. Dimock, have been summarized in the table below. Their conclusions are that "Zineb was outstanding in its performance, equaling or surpassing all other materials with all four diseases. It is probably noteworthy that 9 materials gave good control of Coleosporium rust on asters, even though the checks were abundantly infected. In contrast to this, on snapdragon rust the materials ranged in effectiveness from no control to perfect. Evidently, it cannot be concluded from results with one rust that a given material will prove good or bad on all rusts. Tank-mix Ziram was excellent against 3 diseases, but fell down on Puccinia rust of snapdragon. In previous years, the comparable iron salt (Ferbam) has also fallen down against snapdragon rust. The performance of Captan was disappointing. In other years, this has controlled carnation blight, but was not outstanding on snapdragon rust or iris leaf spot. B622 ranked as in previous seasons, giving poor control of snapdragon rust but good control of iris leaf spot and carnation blight. Crag Fruit Fungicide again gave excellent control of snapdragon rust, but injured the plants. The performance of Hayes 6 Garden Hose Spray Gun proved satisfactory in spite of the very coarse spray delivered."

Ornamentals

Iris

Bulb dipping. Puyallup, Washington, Charles J. Gould. Six replicates of 150 bulbs were dipped September 23, planted the 25th, and harvested the following July. The strongest concentrations of each material were calculated to contain equivalent amounts of sulphur. Aldrin was added for wireworm control and fairly effective. Materials listed in order of yields, all being safe.

	Amt in 22 gals	Y	OP
None		8	
Parzate	1 lb./ 7.5	3	1
Parzate	1 lb./11.4	4	
Parzate	1 lb./15.0	6	
Parzate	1 lb./12.2	1	1
M.E.B. (100%)	1 lb./18.3	2	
Tersan 75	1 lb./13.4	7	2
Arasan SF-X	1 lb./13.4	7	
Vancide 51	1 pt. 12.5	5	
Tersan 75 + Aldrin (50%) W	1.1 lb./13.4	4	

Roses

Black spot *(Diplocarpon rosae)*. Fayetteville, Arkansas. H. R. Rosen. Single applications in mid-spring of Systox, 1 gallon to 800, applied with sprinkling can at one gallon per 10 sq. feet as a possible systemic fungicide against black spot, gave no control.

Snapdragon

Rust *(Puccinia antirrhini)*. Mt. Carmel, Connecticut. Saul Rich. In specially arranged field plots the following fungicides were employed eleven times at 7-day intervals with hydraulic sprayer at the rate of 150 gallons per acre. Plants were inoculated after the eighth spray. All materials were safe. Fungicides are listed in order of over-all preference.

		% infection
Dithane Z78	2-100	3.0
Fermate	2-100	6.2
Orthocide 406	2-100	11.0
Phygon XL	½-100	42.0
Check	——	39.5

Small Fruits

Red Raspberry

Anthracnose *(Elsinoë veneta)*. Puyallup, Washington. Folke Johnson. Field plots of variety Washington were sprayed three times with hydraulic sprayer, April 8 (delayed dormant), May 26 and June 10, without wetting agent, at 200 gallons per acre. Materials listed in order of over-all preference.

		DC	PS	OP
Ferbam	1½-100	3	1	1
Dithane	1½-100	4	1	2
Captan	2-100	5	1	3
Crag 341	1-100	6	1	4
Mag. 70 Sul. paste	4-100	2	2	5
Phygon XL	½-100	1	3	6

Strawberry

Gray mold *(Botrytis cinerea)*. Baton Rouge, Louisiana. N. L. Horn. Fruits dipped in laboratory, once, in mixture of fungicide and spore suspension. Materials are listed in order of safety to the berries.

		DC	PS
Calogreen	2-100	3	1
C. & C. 22A	4-100	3	1
48-CS-36	4-100	2	1
Calo-Clor	2-100	1	2

Strawberry

Leaf blight *(Dendrophoma obscurans)*. Paw Paw, Michigan. R. H. Fulton and Donald Cation. In a comparison between Tag 331 and Actidione five applications were made to field plots with hydraulic sprayer at 150 gallons each beginning in fall of 1952 and ending with post-bloom 1953. Both fungicides gave economical control at lowest concentration used. A fall plus spring spraying did not increase disease control significantly over a single spring application, especially with Tag 331. A spring dormant spray plus three cover sprays was not significantly

RELATIVE PERFORMANCE OF FUNGICIDES TESTED FOR CONTROL OF DISEASES OF ORNAMENTALS—CORNELL, 1953

M. N. Rogers, J. P. Ross, and A. W. Dimock

Iris leafspot *Didymellina macrospora*		Carnation blight *Alternaria dianthi*		Snapdragon rust *Puccinia antirrhini*		Aster rust *Coleosporium solidaginia*	
Material	Rating	Material	Rating	Material	Rating	Material	Rating
Zineb	1	Zineb	32	Zineb	0	Zineb	0
Special Mix*	3	Special Mix*	35	Special Mix*	0	Special Mix*	0
Ziram	12	B-622	41	Zineb-Hayes	0	Zineb-Hayes	0
B-622	14	Ziram	43	Crag Fruit	0[a]	Crag Fruit	0
Zineb-Hayes	14	Zineb-Hayes	46	Math. 275	37	Ziram	0
Math. 466	17	Captan	53	Math. 466	69	B-622	1
Captan	25	Captan-Hayes	56	Ziram	88	Math. 466	9
Crag Fruit	34	Crag Fruit	71	B-622	89	Captan	11
Math. 275	34	Math. 466	81	Captan	94	Captan-Hayes	14
Captan-Hayes	48	Math. 275	85	Captan-Hayes	100	Math. 275	22
Check	100	Check	100	Check	25[b]	Check	100
		0-50 = very light inf. 50-75 = modera.e inf. 75-100 = serious inf.		[a] injurious [b] secondary infection killed leaves, restricted rust development.		Infection on checks was heavy and reasonably uniform in replicates.	

*Parzate 1 Tbsp. + Mariate 50, 1 Tbsp. + Wet Sulf. T Tbsp. + Malathon Em. 57% 2 Tsp. + Water 1 gal.

better than three cover sprays only. Conclude that Actidione used only in the 3 cover sprays on strawberry gives economical control of leaf blight. Residue tests at harvest were negative

Ratings of Fungicides

		DC	PS
Tag 331	½ pint	1	2
Actidione	20 ppm	2	5
Actidione	10 ppm	3	4
Actidione	5 ppm	4	3

Average number of healthy leaflets (of 180 counted)

Tag 331	1 (spring applic')		125
Actidione	20 ppm	3 (cover)	131
Actidione	10 ppm	3 (cover)	122
Actidione	5 ppm	3 (cover)	112
Check		none	38.5

Strawberry

Black root rot *(Complex of Fungi)*. Keeler, Michigan. R. H. Fulton, William J. Young. One post-harvest application of fungicides was made in August 1952, to field plots, with hydraulic sprayer and soil gun, at the rate of 4 gallons per 8 feet of matted row to thoroughly drench the root environment. Plots located on light sandy soil. Four pickings were made to obtain yield. Materials are listed in the order of disease control, overall preference going to the first two.

Ratings of Fungicides

		PS	Y
E. F. 1297 (C & C)	1:16,000	S	1
P-162 (J. Hyman)	50 PPm	S	2
Z78 (R & H)	2 lbs.	S	4
Z78 (R & H)	4 lbs.	S	3
E. F. 1182 (C & C)	1:64,000	S	7
P-162	25 PPm	S	5
PhygonXL	1 lb.	T	6
Check	none		9
D-14	6 qts.	T	10
Phygon XL	2 lbs.	T	8

S=Safe; T=Toxic

Blueberry

Mummy berry. Fennville, Michigan. R. H. Fulton. One ground application made to field plots with hydraulic sprayer or power duster, in spring when apothecia were present and buds ready to open. Weather conditions and fungus inoculum ideal for shoot infection.

Ratings of fungicides

		Infected shoots average No.
Sodium Cyanamid	65% active 17.3 lb./acre	9.5
Calcium Cyanamid dust	76.5 lb./acre	13.0
Check		15.5

Blackberry

Anthracnose *(Elsinoë veneta)* was controlled at Stillwater, Oklahoma, with hydraulic sprayer, by F. B. Struble and Lou Morrison in small replicated field plots with not over 3 applications; delayed dormant, pre-bloom, and petal fall. All materials, equally safe, are listed in the order of disease control and over-all preferance, which are the result of counts of lesions on new canes, total yields and fruit size, but "apparently drought effects were more important than effects of disease in so far as yields and fruit size are concerned." No significant difference in yields.

*Spray Schedule		DC	OP
Bordeaux	8-8-100		
Bordeaux	6-8-100		
Bordeaux	6-8-100	1	1
Bordeaux	8-8-100		
Fermate	2-100		
Fermate	2-100	2	2
Lime Sulfur	8-100		
Bordeaux	6-8-100	2	2
Lime Sulfur	8-100		
Bordeaux	8-8-100		
Boreaux	6-8-100	3	3
Bordeaux	8-8-100		
Boreaux	6-8-100	3	3
Bordeaux	8-8-100	3	3
Lime Sulfur	8-100		
Fermate	2-100		
Fermate	2-100	4	4
Bordeaux	8-8-100		
Fermate	2-100	4	4
Lime Sulfur	8-100		
Fermate	2-100	4	4
Lime Sulfur	8-100	5	5
Control		6	6

*All plots did not receive 3 applications; nor did they always receive the same material for each application.

SOME SIGNIFICANT HIGHLIGHTS IN 1953 TESTS

Tree Fruits

Apricot

The blossom blight phase of brown rot was well controlled in California by Phygon XL, Orthocide, Zerlate, Manzate, and Dithane D14 + Zinc, but not by Vancide 51ZW, Velsicol 90-CS-46 or Cunilate

Avocado

Yellow Cuprocide, 2 to 3 applications in the fall, controlled fruit rot *(Botryosphaeria ribis)* in California.

Peach

Brown rot control on fruit in California was obtained by Captan applied one to two weeks before harvest. Ziram was a second choice. Scab was controlled in South Carolina by wettable sulfur, Orthocide 50, and Vancide F956 but not F995. There Orthocide gave the best fruit finish and held off brown rot almost as well as wettable sulfur, though the latter caused injury at high temperatures and Rhizopus fruit rot followed. Manzate and R and H LO 737 was promising against brown rot. In Ontario, Orthocide gave best brown rot control with Colsul next.

Pear

On pears in Washington, Streptomycin sulfate was ineffective against fire blight. In Oregon, COCS and Parzate were more effective than Streptomycin sulfate against fire blight, Parzate causing lesser injury.

Apple

Naturally, in different parts of the country different materials look best. In Nova Scotia and Virginia, Glyodin (Crag 341) + Merc. gave best scab control, while Colsul was poor, as it also was in New York. 1X concentration was better than 6X. In British Columbia, Manzate was first choice and, in addition, gave remarkable control of mites, doing as well as lime sulfur and DN. Some fruit blotch resulted from the Glyodin-Malathion emulsion used in a concentrate spray. At St. Catharines, Fixtan, Coromerc, Tag, and Orthocide headed the list for scab control in that order. In Maine, Manganese Vancide was the best of a dozen materials tried, and Iron Vancide increased green color of leaves. In New Hampshire, considerable injury resulted from Phygon, HB160, 50-CS-46, 48-CS-73, and 48-CS-36, overall preference going to Captan. In Michigan, Crag 341 was preferred somewhat over Captan, Coromerc, and Ferbam, although all gave good control without injury if applied frequently enough during infection periods. In Oregon, some injury resulted during the past cold wet spring from Kolo, Phygon, and even Captan. In Washington and one test in New York, Captan was preferred for scab control. In Delaware, the antibiotics, Thiolutin, Terramycin, and Streptomycin all fell down on scab control, although not too badly on fire blight control. Parzate and Dithane and Mag. 70 followed by Parzate got top rating where scab, sooty blotch and fruit rot were all concerned. Captan + Z-78 gave best control of Brooks spot. For scab alone, Captan + Dithane Z-78 rated best, with Mag. 70 followed by Captan as second. In Iowa, Lime Sulfur or Lime sulfur + wettable sulfur was more effective than Orthocide and Crag 341 for scab control. For powdery mildew, under Wenatchee Valley, Washington, arid conditions, Karathane was preferred. Materials ineffective against powdery mildew in Washington included Ethyl B622W, Stauffer N244, N521, Crag 658, Penn Salt 1409-W-50, Penn Salt NP770E30, Ovatran, R and H LO 765, and Streptomycin sulfate. Lithium Chloride and Lithium Sulfate caused severe injury to young trees. Fermate was still superior for rust control in New York and Pennsylvania.

Data for past two years in Pennsylvania indicate higher costs of some organics are more than offset by higher fruit (apple) yields above those obtained with a sulfur-Ferbam program. Highest yields came from Crag 341 without mercury, and

(Turn to Page 133)

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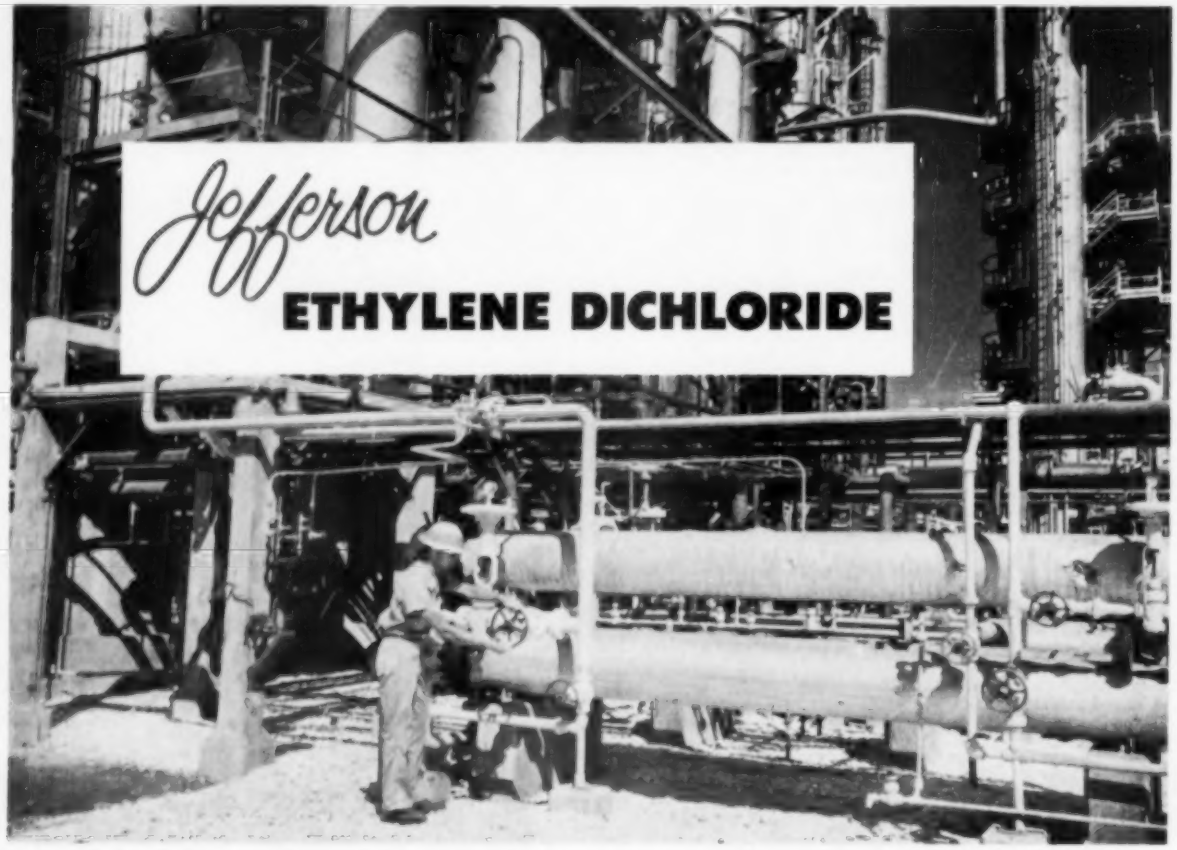

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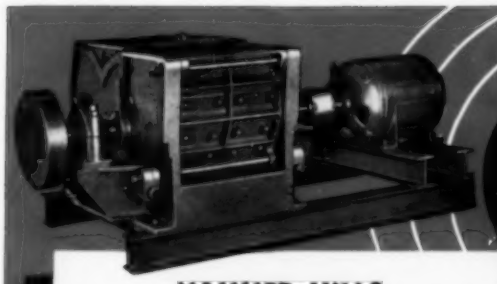

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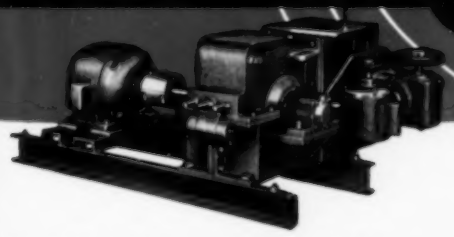

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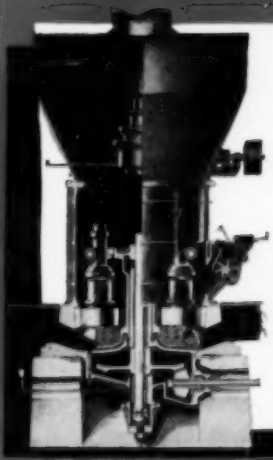

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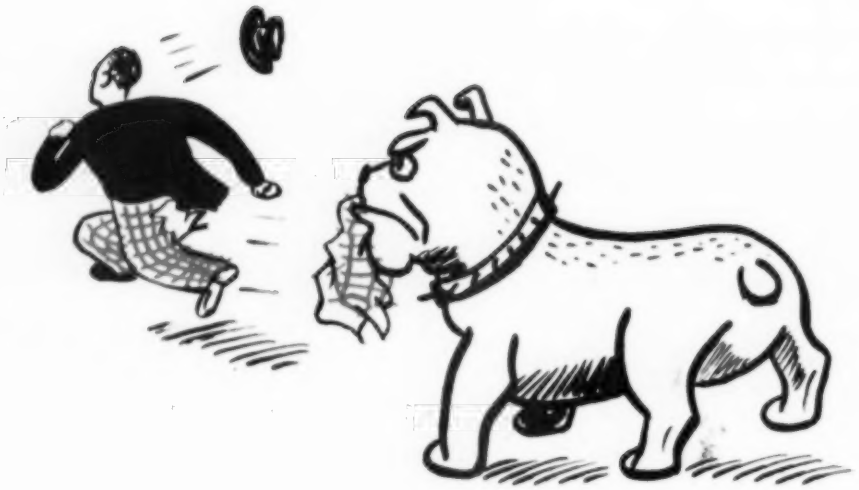

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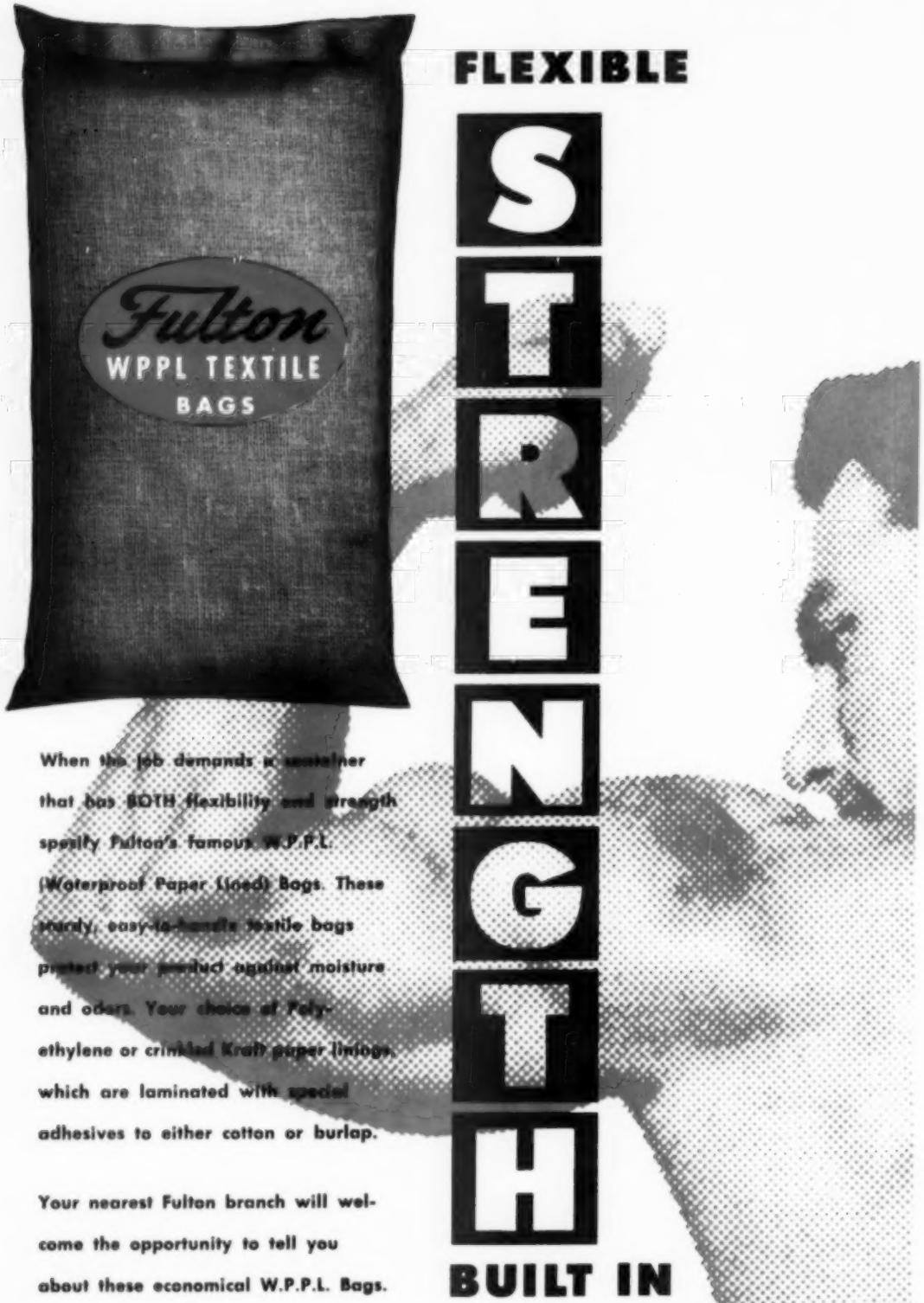

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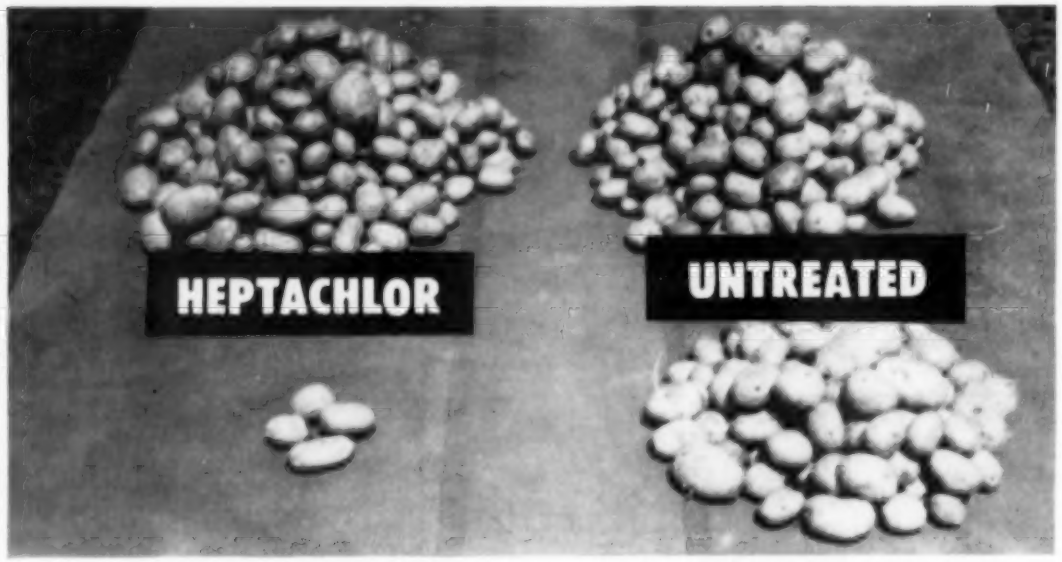

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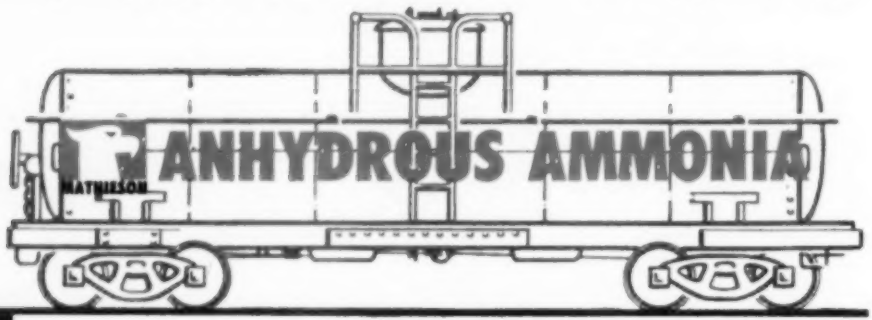

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LISTENING *Post*

Pre-planting Corm Treatments and Chile Mold Reviewed

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

ROY A. Young, of the Oregon Agricultural Experiment Station, writes that bacterial scab, caused by *Pseudomonas marginata*, is one of the most common diseases of gladiolius. Productiveness of corms is not greatly reduced by the presence of scab lesions, but infected corms are unsightly hence have less sale value than comparable clean corms. Control has been attempted primarily through the use of various types of pre-planting corm treatments. Such treatments must also be effective against corm diseases caused by the fungi *Fusarium* sp. and *Stromatinia gladioli*. Mercurial treatments have been used most commonly. In general, long treatments such as a 12-hour or ½-hour soak in mercuric chloride, shorter soaks in mercurous chloride, or soil treatment with mercurous chloride, have given most effective control of bacterial scab. Unfortunately, these treatments have usually retarded germination, growth, and blooming, have reduced the total yield of corms, and have not always given the desired degree of scab control. In Oregon a 30-second dip treatment in New Improved Ceresan, used at the rate of 2 lbs. in 100 gallons of water, gives as good control of Fusarium rot as the more commonly used 15-minute soak and does not have any deleterious effect on growth of gladiolus. However, this treatment is not effective in controlling bacterial scab.

The occurrence of bacterial scab in Oregon gladiolus plantings has been difficult to predict. Scabby corms planted in one area may yield clean corms and in another area may yield heavily scabbed corms. Similarly, scab-free corms may yield heavily scabbed corms from some soil and scab-free corms from other soil, irrespective of pre-planting treatment used. The type of soil appears to have little effect on scab development since severe scab has been observed on both heavy and light soils.

The frequent occurrence of scabby corms in soil infested with wireworms suggested that these or other insects might affect the amount of bacterial infection by aiding invasion through wounds. If so, the addition of an insecticide to the preplanting treatment mixture might reduce the incidence of scab by killing or repelling soil insects capable of wounding the surface of corms and providing points of entry for the bacterium.

To test this possibility, a preliminary trial was conducted in 1951 in which moderately scabby corms were dip-treated in "New Improved Ceresan" (2 lbs.-100 gal.), New Improved Ceresan plus 2 lbs. of 20% aldrin, New Improved Ceresan plus 2 lbs. of lindane, or received no treatment prior to planting. The mean percentage of scabby corms that subsequently developed from each lot was 81.6, 32.0 33.3, and 87.0, respectively. The incidence of scab on the corms grown from stock treated with either aldrin or lindane was approximately 50 percent less than on corms grown from stock treated with New Improved Ceresan alone or from untreated planting stock.

In 1952, a larger trial was carried out in which four New Improved Ceresan-insecticide combinations were tested. Six lots of 400, size four, Snow Princess corms were each given one of six treatments, then planted in a random block planting in four replications of 100 corms each in soil where Fusarium rot had not been prevalent. The materials used, and their effect on stand, number of corms harvested, corm weight, and incidence of scab are shown in Table 1.

TABLE 1.

The effect of pre-planting treatment of gladiolus corms in fungicide-insecticide mixture on stand, yield and incidence of scab.

Treatment	Stand	No. of corms	Weight of corms	Corms with scab lesions
			oz.	%
NIC[a]	99.2	94.5	94.0	58.3
NIC + 20% aldrin (2 lbs-100 gal.)	98.7	94.2	95.5	24.2[b]
NIC + 20% aldrin (1 lb-100 gal.)	95.5	96.5	92.7	54.1
NIC + 20% heptachlor (2 lbs.-100 gal.)	97.7	95.7	95.5	17.6[b]
NIC + 5% lindane (10 ml/gal.)	99.9	94.7	98.2	56.5
Untreated check	97.5	96.0	95.0	71.9

[a]NIC—New Improved Ceresan (2 lbs. in 100 gallons of water). All treatments contained DuPont Spreader-Sticker, ½ pt. in 100 gal.
[b]Differences significant at 1% level.

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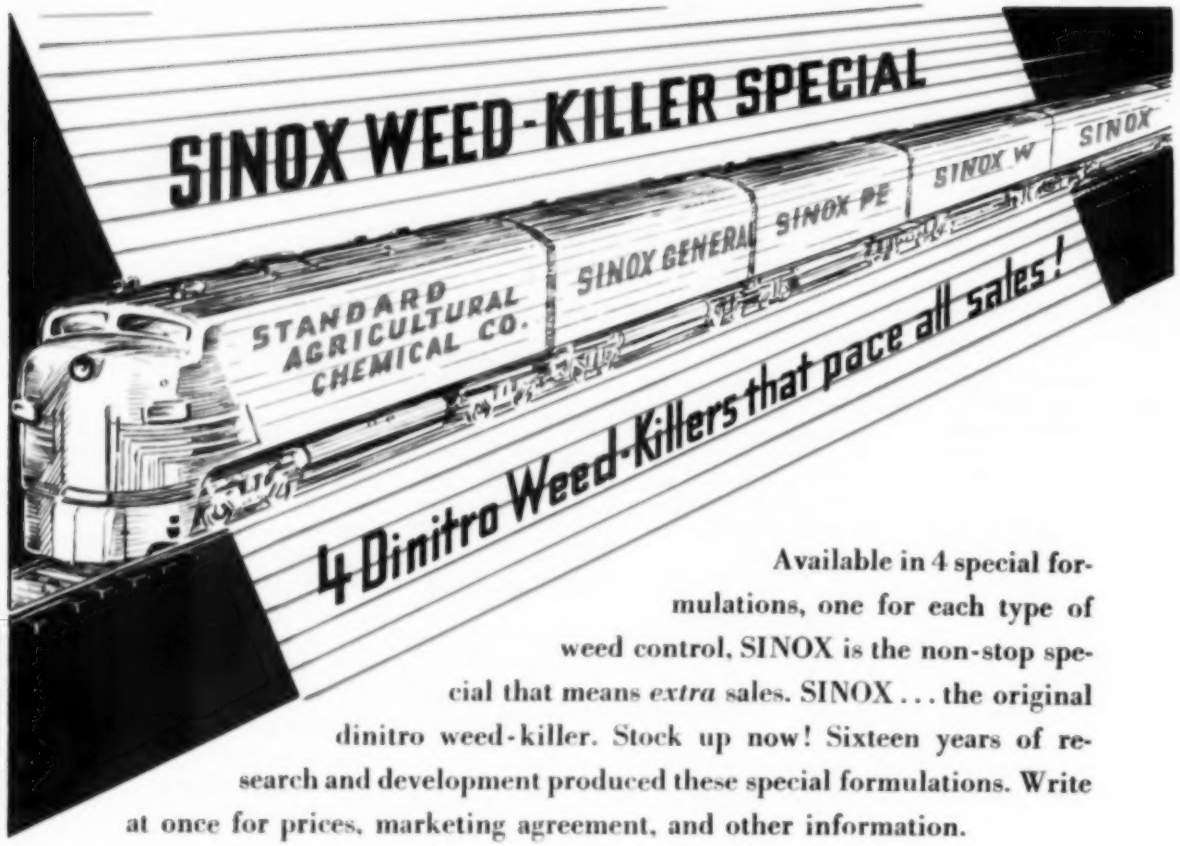

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None of the treatments significantly affected stand, number of corms harvested, or weight of corms. However, treatment of corms in mixtures containing 2 pounds of New Improved Ceresan plus 2 pounds of aldrin or 2 pounds of heptachlor per 100 gallons resulted in significant reduction in the incidence of scab lesions as compared to both the New Improved Ceresan treated and the untreated lots. Similar results were obtained in experimental plots in two other areas. The discrepancy in results with lindane in 1951 and 1952 is probably due to the use in 1952 of a concentration too low to be effective.

The addition of insecticidal chemicals to gladiolus pre-planting treatment mixtures should be investigated in other areas. Tests should be conducted also to determine the effectiveness of pre-planting corm treatments as a means of preventing wireworm injury to gladiolus. If effective, treatment of corms would offer a very economical means of wireworm control.

The present recommendation for pre-planting treatment of gladiolus corms for scab control in Oregon is a 30-second dip-treatment in a mixture of 2 pounds of New Improved Ceresan, 2 pounds of 20% aldrin or heptachlor, and ½ pint of Triton 1956B or DuPont Spreader-Sticker in 100 gallons of water. This recommendation is based on experimental trials in 1951 and 1952 and observations of successful scab control in a commercial planting in 1953. In three experimental trials, the addition of aldrin and heptachlor to corm treatment mixtures resulted in significant decreases in the incidence of scab and had no deleterious effect on gladiolus that could be measured by emergence, flowering, or yield comparisons.

TABLE 2.
Effect of Field Application of Fungicides for Control of Internal Mold of Chile, *Capsicum annuum*.

Fungicide	Percent better than check				
	Year				
	1950	1951	1952	Average	Rank
1. Phygon XL	22	15	17	18	1
2. Dithane	15	10	13	13	3
3. Zerlate	14	12	13	13	2
4. Copper-Hydro	12	7	16	12	4
5. Dehydroacetic acid	5	0	7	6	5

Effect of Fungicides and Spraying Schedules Upon Chile Mold

CHILE is also commercially known as red pepper. It is the dried fruit of the pepper plant, *Capsicum annuum*. Chili is another spelling, especially in trade circles. According to Philip J. Leyendecker, Jr., of the New Mexico Agricultural Experiment Station, New Mexico produces a considerable amount of sun-dried chile, which demands a premium price because of its high pungency and bright color. Kiln-dried chile is very dark red and does not impart the bright color, which, in southwestern cookery, is characteristic of the sun-dried product.

Many shipments of New Mexico sun-dried chile, upon reaching market, have been found to contain large numbers of pods which contain internal molds. Most of these moldy pods cannot be detected by external examination. Twenty-one different species of fungi have been isolated from moldy pods in New Mexico. From 80 to 90 percent of the damage was caused by different species of *Alternaria*, *Fusarium*, and *Hormodendrum*. These fungi develop mainly after the first killing frost, when 40 to 60 percent of the crop is still fleshy and subject to injury. It has been shown that after such frosts the pod wall, at the calyx end, pulls away from the seed mass. This creates a space for air-borne spores to enter the injured pods, and the pod cavity provides excellent conditions for the germination and establishment of the air-born fungi.

Internal mold is a serious problem confronting the chile industry in New Mexico because shipments of moldy pods have been refused or down-graded, giving the entire production of sun-dried chile from the State an unfavorable reputation.

A practicable control measure appeared to be the application of commercial fungicides to fruited plants in the field. The New Mexico Agricultural Experiment Station undertook a three-year study of the effectiveness of various fungicides.

Small, randomized-replicated field plots were established on the New

TABLE 3.
Effect of Time of Application Upon Control of Internal Mold of Chile, *Capsicum annuum*.

Treatment	Percent better than check				
	Year				
	1950	1951	1952	Average	Rank
A. One application before frost	10	11	9	10	4
B. Two applications before frost	14	10	11	12	2
C. One application day after frost	17	15	20	17	1
D. Two applications day after frost and one week later	8	14	12	11	3

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Mexico A & M College horticultural farm. All plots were field seeded to a local strain of chile known as College No. 6, a large-fruited, thick-walled selection which is very susceptible to internal mold. The following fungicides, with a spreader-sticker added, were applied with a small pressure sprayer at the strengths indicated: Phygon XL 1 lb. per 100 gals. water (U. S. Rubber); Zerlate 1½ lbs. per 100 gals. (DuPont); Dithane 1½ lbs. per 100 gals. (Rohm & Haas); Copper-Hydro 6 lbs. per 100 gals. (Chipman); and dehydroacetic acid (DHA-S) 1% (Dow). The following spraying schedules were followed: A, One application October 15. B, Two applications, October 15 and October 30. C, One application, day after killing frost. D, Two applications, day after killing frost and one week later.

After spraying, all pods remained on the plants to sun-dry. When the pods were field cured, usually about December 15, they were harvested and examined in the laboratory by splitting open each pod and scoring for the presence or absence of fungi.

Tables 2 and 3 show that appreciable control of internal mold can be obtained from the application of fungicides to fruited plants in the field. Of the materials tested, Phygon XL gave the best results, followed by Zerlate, Dithane, and Copper-Hydro. The latter three fungicides gave almost equal control. Dehydroacetic acid was not effective.

Internal mold cannot be entirely eliminated by the field application of fungicides. However, the fungicides decreased appreciably the extent of internal and external fungal contamination of the pods. The mold colonies in treated pods were invariably restricted in size, and the external mold growth on the pedicel and calyx was materially reduced. This in turn would make for a mold-free ground chile, since the calyx and pedicel are usually ground in the preparation of chile powder.

The timing of the fungicide applications appeared to influence the efficiency of control (Table 3). The best control was obtained when the succulent pods were sprayed the day following the first killing frost. An additional spray application one week later did not seem to afford additional protection from mold contamination. Sprays applied before frost were probably less effective because they reduced the spore inoculum potential for a period following spraying, but afforded little protection at frost time, when pod injury occurred.

Grasshoppers On Increase; Chinch Bugs '54 Threat

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

Grasshoppers On Increase In Certain Areas

INFORMATION recently released by the Grasshopper Control Project on surveys jointly conducted by the Project and cooperating State Agencies states that grasshoppers are on the increase in various areas. Crop land area surveys show that there are build-ups in portions of southeastern Nebraska, eastern Kansas, southern Iowa, the entire State of Missouri, and central Wisconsin. The infestations ranged from light, three to seven per square yard, to very severe, 28 or more per square yard. The greatest increase in populations appeared to be in Missouri and Wisconsin. In the rest of the states in the western half of the United States, crop land infestations generally are scattered and local.

Grasshopper infestations serious enough to warrant large-scale control programs on range land areas in 1954 are expected in 13 of the western states. These infestations cover approximately 4,733,240 acres of range land. Of this total 2,636,610 acres are private lands, 604,150 acres state land, and 1,492,480 acres public domain. The latter lands are under the management of the Forest Service, U.S. Department of Agriculture and Indian Service, Department of the Interior. In Arizona, California, Nevada, and Utah, 329,140 acres are private lands, 2,000 acres state lands and 1,492,480 acres public domain. Idaho, Montana, Oregon, and Wyoming have infestations on 168,020 acres of private land, 24,200 acres of state land, and 369,780 acres of public domain. In Nebraska, 400,000 acres of private sandhill range are infested. Colorado, New Mexico, Oklahoma, and Texas have infestations totaling 1,739,450 acres on private lands, 577,950 acres on state lands, and 627,600 acres on public domain. The most urgent situation from the standpoint of need for organized control efforts in 1954 appears to be in north central New Mexico, south central Colorado, central Idaho, and the panhandle areas of Oklahoma and Texas.

Chinch Bugs May Be of Economic Importance

CHINCH bug surveys were conducted in 9 states in the fall of 1953: Arkansas, Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, Oklahoma, and Wisconsin. Results of surveys as reported by the states following their processing of the soil samples collected indicate that these bugs could be of economic importance in 1954 in northeastern Arkansas, southeastern Missouri, northern Illinois, and northwestern Indiana, with local trouble spots in northeastern Indiana, south central Illinois, east central Oklahoma, south-

(*Turn to Page 142*)

ALABAMA PEST CONTROL CONFERENCE

THE Alabama Plant Pest Control Conference was held on February 23, 24, and 25 at the Alabama Polytechnic Institute, Auburn, Alabama. The Conference consisted of the eighth annual workshop for plant inspectors conducted on February 23, and the fifth annual short course for aerial applicators and pesticide manufacturers and distributors held on February 24 and 25. Approximately 135 persons attended the three-day conference. In attendance at the various sessions were farmers, plant inspectors, aerial applicators, and representatives of 21 chemical manufacturers and distributors from Alabama, Georgia, Mississippi, North Carolina, and Tennessee, and personnel of the Alabama Polytechnic Institute.

The conference was conducted under the auspices of the Agricultural Experiment Station of the Alabama Polytechnic Institute. Participating agencies consisted of the Division of Plant Industry, State Department of Agriculture and Industries; State Department of Aeronautics; Alabama Flying Farmers Association, and Pesticide Manufacturers and Distributors.

Workshop for Plant Inspectors

THE morning session of the program of the eighth annual workshop included a discussion of "Problems Involved in Sweetpotato Production." Subject matter specialists spoke on the following topics: (1) diseases—U. L. Diener, assistant plant pathologist; (2) insects—Lacy Hyche, assistant in entomology; (3) fertilization—L. M. Ware, horticulturist; (4) varieties—W. A. Johnson, assistant horticulturist, C. C. Carlton, superintendent, Chilton Area Horticulture sub-station, R. L. Livingston, assistant horticulturist, and T. S. Morrow, superintendent, North Alabama Horticulture sub-station; (5) mechanization—C. C. Carlton and R. L. Livingston; and (6) utilization of sound, jumbo, and cull potatoes—H. H. Harris, associate horticulturist. It was clearly emphasized that the use of Porto Rico, a variety of sweetpotato formerly the predominant one grown in Alabama, is being replaced by three new varieties, namely, Goldrush, Allgold, and Earlyport. All three varieties have a greater yield per acre, have better inside color, and have more resistance to some of the diseases when compared with Porto Rico.

Presentation of papers scheduled at the afternoon meeting of the workshop included, "Status of the Chestnut Program: Methods of Propagation" by J. C. Moore, assistant professor of horticulture; "Pecan Survey" by L. M. Ware; "Nursery Understock," by W. A. Johnson; "Nutrient Deficiency Studies of Camellias and Azaleas," by Tok Furuta, associate horticulturist; and "Soil Fumigation Methods in Greenhouses," by H. P. Orr, associate horticulturist. A panel discussion on problems of plant inspectors was moderated by Wiley Hill, III, State Department of Agriculture and Industries, Montgomery, Alabama. Following a tour of the greenhouses of the horticulture department at Alabama Polytechnic Institute, the meeting adjourned.

Presiding at the morning and afternoon sessions were James A. Lyle, associate plant pathologist, and T. S. Morrow.

5th Annual Short Course

THE program for the fifth annual short course for aerial applicators and pesticide manufacturers and distributors opened on February 24 with an address of welcome by Dr. Ralph B. Draughon, president, Alabama Polytechnic Institute.

Dr. E. V. Smith, dean and director of the School of Agriculture and the Agricultural Experiment Station, then spoke on "The Role of Plant Pest Control in Our Agricultural Program." Dean Smith stated that farmers can ill afford to let plant diseases, insects, and weeds take a toll from agricultural production. He said with fewer people on farms to produce food and fiber for increasing population, the role of plant pest control is of major importance to our agricultural program.

Last year an additional 45,780 acres in Alabama, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee were found for the first time to be infested with white-fringed beetle, B. P. Livingston, chief of the Plant Industry Division, State Department of Agriculture, reported. White-fringed beetles have now been found in 422,536 acres in 159 counties of these eight states. Alabama has approximately 34 per cent of the known total infested acreage.

The Agricultural Experiment Station of the Alabama Polytechnic Institute has joined with five other cotton belt stations, the U. S. Department of Agriculture, and the National Cotton Council in a concentrated research program to find practical ways of combating spread of cotton's most destructive pest, the pink bollworm. F. S. Arant, entomologist, told the conferees of the multi-barreled attack on this pest. He pointed out that in recent years pink bollworm has gradually moved eastward and is now within 400 miles of Alabama's border.

The Alabama station's part in this program involves laboratory and field studies of systemic and other insecticides, Arant explained.

R. L. Robertson, assistant in entomology, discussed the effect of cotton insecticides on beneficial insects. The presentation of this material terminated the morning session which was presided over by M. D. Gilmer, assistant commissioner, State Department of Agriculture.

L. H. Smith, director, National Flying Farmers Association, presided at the afternoon meeting on February 24. 2 In a discussion on the economics involved in the control of pests of agricultural crops, F. S. Arant and L. M. Ware spoke on field crops

and horticultural crops, respectively. It was explained that in considering methods of control and the economic feasibility of pest control, three factors are important: potential value of crop protected; severity of loss expected; relation between cost of protection and increase in crop value or insurance value of protection.

Experimental evidence shows that insecticides can cause mortality, declared A. O. Haugen, leader, Alabama Coop. Wildlife Research Unit. If applied at excessive rates the decreasing order of insecticide susceptibility for certain wildlife is: (1) fish which are most susceptible, (2) reptiles and amphibians, (3) birds, and (4) mammals, which are least susceptible. The secondary effect of herbicides through habitat reduction is probably more far reaching than their direct effect in accidental poisoning. Arsenical herbicides, however, are an exception to this rule and their use in areas with game species should be discouraged.

Two new techniques to aid in pond weed control were developed at the Alabama Polytechnic Institute Agricultural Experiment Station in 1953, according to J. M. Lawrence, assistant fish culturist. The first technique was a platform method for applying inorganic fertilizers. The fertilizer materials are placed on an underwater platform and the wind-wave action distributes the elements throughout the pond water. The second technique was the use of "floats" to apply Hercules Algicide D-70 for the control of several forms of filamentous algae.

R. L. Self, plant pathologist, stated that diseases and nematodes are becoming the limiting factors in the production of ornamentals and lawn grasses. He said that at least six destructive species of external feeding nematodes have been found in large numbers on azaleas, camellias, Japanese magnolias, lawn grasses and other ornamentals in southwest Alabama, the damage usually consisting of stubby roots and stunted yellowish plants.

According to B. W. Arthur, assistant entomologist, damage to ornamental plants by insects reduces the vitality or may cause death of the plants, and lowers the sale value. Demeton or Compound 21/116 applied to the soil show good control of the tea scale on sasanqua and Burford holly liners. He stated that seven weeks after date of last application, demeton applied to the soil continued to give 100 percent control of this insect.

Nation-wide damage to saw timber from forest insects exceeds total losses from forest fires, declared R. J. Kowal, U. S. Forest Service entomologist, at the last day's session.

With tremendous progress of forestry in the South, destructive insects to forests have taken on added importance. In recent years, he said, millions of board feet of timber have been lost by inroads of southern pine beetles, black turpentine beetles, sawflies, and Ips engraver beetles. These losses have occurred in Texas, Arkansas, Louisiana, Mississippi, and Alabama.

To combat the problem, we need a better system of reporting outbreaks, and more research on the habits and life histories of the common as well as new insects attacking timber, Kowall concluded.

Dr. G. H. Hepting, chief of forest disease investigations, USDA Southeastern Forest Experiment Station, Ashville, N. C., traced the

(*Turn to Page* 151)

Top: Wiley Hill, plant inspector, Middlebrook; B. P. Livingston, Division of Plant Industry, State Department of Agriculture and Industries; J. A. Lyle, associate pathologist, and L. M. Ware, horticulturist, API.

Bottom: M. D. Gilmer, State Department of Agriculture and Industries, Montgomery; Dr. E. V. Smith, API School of Agriculture and Agricultural Experiment Station; Harry Smith, National Flying Farmers Association, Opelika, and F. S. Arant, entomologist.

Top: Asa Rountree Sr., Alabama Dept. Aeronautics; G. H. Hepting, USDA, S. E. Forest Experiment Station, Ashville, N. C.; R. J. Kowal, Forest Insect Investigations, USDA, Gulfport, Miss.; W. G. Eden, API entomologist.

Bottom: George Wilson, Seminole Air Service, Foley; W. A. Ruffin, extension entomologist, API; George Williamson, Agricultural Sulfur and Chemical Co., Montgomery; Raymond Griffin, Southland Dusting Co., Montgomery, and Burt Fuller, Alabama Flying Farmers Association.

WASHINGTON Report

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

"INSTEAD of digging a basement, they've raised the whole house! Thats what several nitrogen producers have to say after surveying the government's higher nitrogen goals. Others feel that politics is back with a capital P.

The eleven per cent inflation in the nitrogen goal scheduled to be reached by 1957 amounts to 405,000 tons. This makes it possible for the Government to hand out rapid tax write-offs up to this amount. However, the growing protests over the way the decision was made makes it doubtful the full tonnage will be allocated.

Some USDA officials believe that many of the questions raised by industry have been caused by a lack of understanding of what a mobilization goal really is, but that give and take meetings between industry and government will help in clarifying this point. In the government's opinion much of the sensitivity of industry has been caused by rather heavy inventory and the fall drop in the fertilizer business. After some reportedly heated exchanges in private, the government is studying new figures from industry which show the total production capacity. Some industry men hope that this "new look" at nitrogen capacity will make it clear to the government that there is no need to rush out with a hat full of tax certificates.

Industry says, there are many ways to view capacity. When you judge it in time of peace, costs are a prime consideration. Costs include the price of raw materials and nearness to consuming markets. In wartime, the cost factor varies in importance depending on the urgency with which nitrogen is needed. Furthermore, capacity can be pushed beyond rated production.

As a sidelight, some are wondering how valuable a tax certificate really is. With taxes scheduled to be reduced and sufficient raw materials available for practically anyone to enter the business—what is the government certificate worth?

The nitrogen situation, with all its surprises seems likely to keep Washington officials busy for a good many more months.

* * *

Trouble with laws and government regulations is they have the habit of popping up in the wrong places. That's what some industry men think about the law that compels the use of U. S. ship bottoms.

When Harold Stassen's organization asks the U. S. fertilizer industry to bid on materials for delivery to other countries, it insists that U. S. ships be used. Since rates are three dollars or more a ton over foreign competition, U. S. producers are often licked.

One plan of meeting the bottleneck is to let the government subsidize the boat fare to the extent that U. S. and foreign rates are equalized. This could be done, but it means another government handout. On the other hand, the fertilizer industry is penalized when it uses U. S. shipping, advocates argue, so why shouldn't the industry be permitted to meet foreign competition on an equal footing?

Fertilizer exports, including government financed and private sales, are estimated at less than five per cent of a year's total dollar volume. Even so, five per cent can be an important figure.

* * *

AT PRESS TIME THE HOUSE INTERSTATE AND FOREIGN COMMERCE COMMITTEE WAS SCHEDULED TO HOLD HEARINGS ON THE MILLER BILL (H.R. 7125). THERE APPEARED TO BE AN EXCELLENT POSSIBILITY THAT ACTION BY THE FULL HOUSE OF REPRESENTATIVES MIGHT COME MUCH MORE RAPIDLY THAN HAD BEEN ANTICIPATED.

President Eisenhower's health program is jamming the House Interstate and Foreign Commerce Committee schedule with no end in sight. Some believe that hearings on current bills will be completed in March. However, still other bills loom as new additions to the Committee's work load. Specifically, the pending railroad retirement measure could block out a month or more. It's marked top priority.

So, the question is, can enough pressure be brought to force hearings on the pesticide bill? Congressman A. L. Miller (R.Neb.) believes so. "I fully expect the Committee to favorably report the pesticide measure I introduced. I have been gratified at the many letters in support of the bill from industry and private individuals as well."

With industry, major farm organizations, commodity groups and the Food and Drug Administration backing the measure, passage by the Committee is considered likely. However, legislative experience shows that nothing can be taken for granted. The longer action is postponed, the more difficult it becomes to get the bill moving.

Meanwhile, Senator Aiken, chairman of the Senate Committee on Agriculture and Forestry has introduced the identical bill in the Senate. Because of the rather extensive study of the measure in the House, Senator Aiken prefers not to take the initiative. Rather, he would like to see the House complete action soon. Then, he will press the measure in the Senate. His many years of experience and prominent position in the Senate are certain to command attention.

Senator Aiken is keeping in close touch with developments in the House and is ready to move when the opportunity to do so arises.

* * *

Need for the vast research and development program of the insecticide, industry is being underscored

by reports of spreading insect resistance to certain sprays and dusts. Those who have been warning that resistance would become a major problem appear to be born out by events last year and the prospects for the 1954 season.

Among the insects showing resistance to DDT are: Colorado potato beetle, grape leaf hopper, apple leaf hopper, cabbage looper, imported cabbage worm, potato flea beetle, lygus bug on alfalfa. Reports of resistance come from many parts of the country and from agricultural scientists with varied backgrounds and training.

In many cases, the problem is essentially one for the companies themselves to tackle. However, on an industry-wide basis, it might be well to inform agricultural leaders and farmers that industry is meeting the problem in a number of ways. Also, that solutions are possible only because of the continuous program of research financed by industry plus close cooperation with the USDA and agricultural college scientists.

Happily this is recognized by the authors of the pending Miller Bill. However, it was not recognized by the proponents of previous legislation.

Although the problem of resistance is far from solved, there is confidence it will be dealt with successfully. The work now being done on the problem again demonstrates the importance of encouraging business initiative.

* * *

Resistance is the main topic for discussion during a three day Washington meeting sponsored by the Office of Naval Research and the University of Pennsylvania. The meeting begins March 25. Herbicides, insecticides and drugs will be covered.

Dr. Charles E. Minarik, Camp Detrick, Frederick, Md. will talk on herbicides. Professor Richard Kuhn, Heidelberg, Germany, will cover certain aspects of resistance of the Colorado potato beetle.

Dr. E. F. Knipling, USDA is scheduled to moderate a panel devoted to discussion of resistance to insecticides. Dr. Leigh E. Chadwich, Army Chemical Center, Maryland is expected to present important data during the panel meeting.

* * *

New help for future "buy early" campaigns is in the making. It will help industry solve the perennial problem of how to make the slogan ring the cash register.

The help will be in the form of "intelligence" about insect enemies threatening the farmer. More will be known about the kind, location, and strength of the enemy. In most cases this will be known before major attacks occur. It will be known in time for the farmer to heed the advice and buy early.

Intelligence will come from a corps of scientists specially trained in reporting insect conditions in the field and interpreting the information for practical application.

New agreements are going into effect with a full time surveyor in Texas, Louisiana, Florida, Arizona, Utah, Kansas, Missouri, and Maryland. Other states in the cornbelt and south are readying similar programs.

Both federal and state funds are being used.

* * *

Keep using that pencil when writing down new room numbers and phone extensions of USDA officials—they are still moving. One group is scheduled to move back where they started from in December. This time one floor higher.

Question of who handles what—is still perplexing the reorganizers. For instance if you are working on an insect that is born in a farmer's field and may end up in a cereal product in the home you have three separate organizations to deal with—all in agriculture.

When the bug is in a farmer's corn field—you deal with the Cereal and Forage Investigation officials. When the bug is in commerce, that is in a mill or on a train—you consult with the Agricultural Marketing Service officials. Then, when the bug shows up on the kitchen cupboard, you check with the chiefs of the units dealing with Insects Affecting Man and Animals.

Instead of diminishing, confusion seems to be growing, if that's possible.

* * *

Not to be outdone by the entomologists, who are preparing shortly to celebrate the 100th anniversary of entomology with dinners, speeches, a commemorative stamp, etc., the American Phytopathological Society took steps at its meeting last fall to publicize work in plant disease control. A committee of the APS of six members, headed by Paul Miller, Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A., Beltsville, Md., directing the public relations program, has just announced that Robert Rathborne of the Office of Information, U.S.D.A., has been engaged to do a series of informative articles which will be published in the agricultural trade press.

* * *

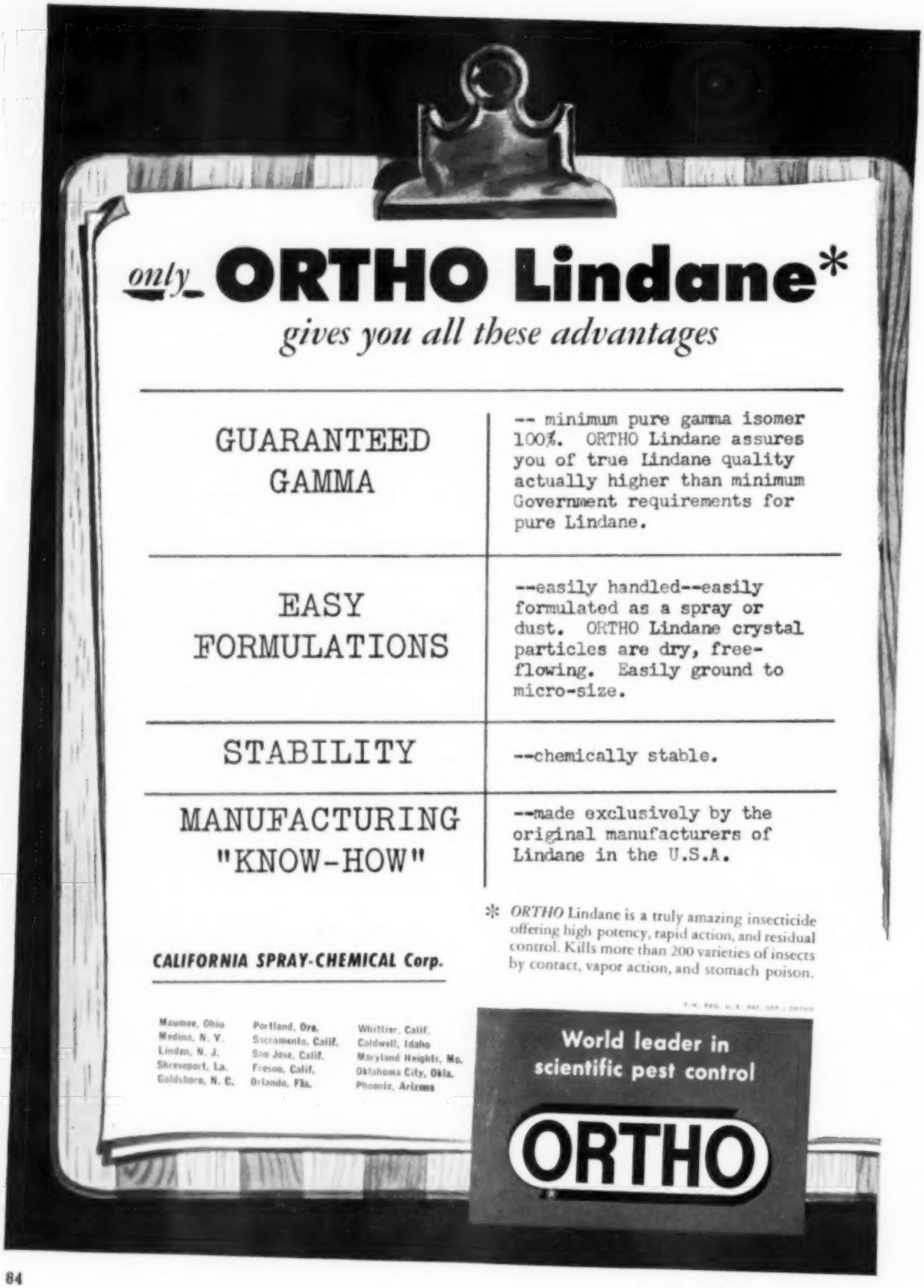
A market that never materialized. We refer to the huge market for agricultural chemicals that was optimistically being anticipated a few years back in eradication of mesquite throughout the southwest. It was hoped that this field would take a big annual volume of herbicides and defoliants, but up to this point the field has been a distinct disappointment. Perhaps the falling price of beef cattle might be the explanation.

* * *

Whoever picks the locales for some of our important and multitudinous industry meetings should have a heart on the poor traveler. The first and second requirements of acceptable convention cities, it might well be remembered, are that it be possible to reach them conveniently by rail and plane, and that the hotel accommodations be adequate to handle the anticipated attendance in comparative comfort.

We recall with no enthusiasm at all a session held some winters back in Baton Rouge, where it was optimistically anticipated that the delegates could be housed in dormitories. More recently we have been face to face with the inevitable conclusion that there is simply no way to get into Biloxi expeditiously by plane. From the west coast comes word of a meeting this year at Bend, Ore., (where's that?) and another at a Y.M.C.A. camp some miles distant from Denver. Shades of Lake Tahoe,—with its unenviable telephone service and the impossibility of getting any laundry done, or having a suit pressed.

Why don't the boys who arrange these matters have a heart?



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ORTHO

INDUSTRY *News*

Beeson in N.L.R.B. Post

Albert C. Beeson, whose nomination to the National Labor Relations Board brought considerable

ALBERT C. BEESON

debate by Democratic members of the Senate last month, was confirmed to the N.L.R.B. post by vote of the Senate on February 18th. Prior to his nomination, Mr. Beeson was with the Food Machinery and Chemical Corp. of San Jose, Calif.

•

Esberg Resigns

Resignation of Alfred M. Esberg, a director and a vice president of American Potash & Chemical Corp., was announced last month by the company.

•

Nitrate Curbs Eased

The U.S. Coast Guard has relaxed port restrictions on the handling of nitrate fertilizers which have been in effect since a 1947 explosion in Texas City, Tex. The restriction applied to fertilizer mixtures of 60 per cent ammonium nitrate and 40 per cent phosphate salts by weight. Under new instructions, the nitrate mixtures may now be handled within U. S. ports, its territories and possessions, in accordance with normal regulations governing explosives or other dangerous products containing nitrates.

•

Canadian Entomologists Meet

The annual 1954 meeting of the Entomological Society of Canada will be held jointly with that of the Entomological Society of Ontario at Sault Ste. Marie, Ontario, November 1-3, 1954. This will be the only meeting of the Entomological Society of Canada during the year.

•

Davison Safety Meeting

The Davison Chemical Corporation's Cincinnati plant will be host at the company's annual safety meeting, to be held in the Vernon Manor Hotel February 15-17 inclusive. Safety Engineers, industrial relations men, and in some instances superintendents and their assistants from 12 plants will attend to learn about new safety methods and to exchange experiences. A. B. Pettit, Davison's supervisor of industrial health and safety, will preside, and J. W. Long, manager of the Cincinnati plant, will greet visitors.

Emphasis on safety by Davison has won many awards for the Company—35 in one year from four national organizations.

Eichler Rejoins Prentiss

Prentiss Drug & Chemical Co., Inc., New York, has expanded its staff and activities with the addi-

WM. A. EICHLER

tion of William A. Eichler as midwest sales representative. His headquarters will be Prentiss' midwest offices in Chicago.

An Air Force veteran of World War II, Mr. Eichler started in the chemical business with Prentiss in 1945 as a salesman. He became associated with the Velsicol Corporation in 1948 and remained there until he rejoined Prentiss late in February.

•

Oldbury Names Mattox

Oldbury Electro-Chemical Co., recently named James L. Mattox as chief engineer for their plant in Columbus, Miss. Mr. Mattox was formerly an electrical engineer with the T.V.A., and is a past president of the Tennessee Valley Public Power Association.

Executive Committee and past Presidents of the Cotton States Branch, Entomological Society of America, left to right: R. C. Gaines, Dr. E. W. Dunnam, Dr. H. H. Ross, President ESA, C. E. Smith, Dr. W. E. Dove, K. L. Cockerham, Chairman F. S. Arant, Dr. C. O. Eddy, H. C. Young, Prof. R. W. Harned, L. C. Murphree, Secretary-Treasurer, J. W. Ingram, Dr. John T. Creighton.

Cyanamid High Bidder on Plant

American Cyanamid's offer of a rental of $13.23 on each ton of ammonia produced, or a minimum rental of $343,980 a year was reported as the best offer received by the government in recent bidding for the ammonia producing unit of the Missouri Ordnance Works at Louisiana, Mo. Negotiations are now under way to lease the facilities to the American Cyanamid Co.

Under maximum operating conditions, the rental could exceed $500,000 annually, on the proposed plan. Cyanamid's offer calls for a six-year lease on the plant, with two six-year renewal options and the right to purchase the plant outright at any time within the first three years at a price of about $3,325,000. The plant built in 1941 has a maximum capacity of 105 tons of ammonia daily.

•

Brunton Sales VP of Kolker

J. G. Brunton, who resigned in December as sales vice-president of Diamond Alkali Company's organic chemicals division has joined Kolker Chemical Corporation, Newark, N. J., in a similar capacity. This marks Mr. Brunton's second association with a Kolker company. In 1949 he joined Kolker Chemical Works, Inc., as sales vice-president, and continued in that post upon the firm's acquisition by Diamond in 1951. Previously, he was with Pennsylvania Salt Manufacturing Company, Philadelphia, for ten years.

New Diamond Fert. Plant

Leasing of the fertilizer plant of the former Buckeye Sugar Co. in Ottawa, Ohio, and an expansion program to eventually double facilities was announced by the Diamond Fertilizer Co. of Sandusky. Howard Morgan, vice president and secretary of the Sandusky firm, said the new facilities will be known as the Diamond-Ottawa Agricultural Chemical Co. Mr. Morgan said the Ottawa plant will handle products of both companies to give growers in the territory a more complete variety of fertilizers.

New Coined Names

Two new coined names for chemical products have been selected by the Interdepartmental Committee on Pest Control. The word "Dichlone" is the coined name for the fungicidal chemical 2,3-dichloro - 1,4-naphthoquinone and "Glyodin" is the name given to describe the fungicidal chemical, 2-heptadecyl glyoxalidine acetate.

•

Central Calif. Ag. Forum

The Central California Agricultural Forum was held February 24th at the Fresno District Fairgrounds, Fresno, Calif. Frank Long, W. L. Smith, and Glenn Harris, all of the Agricultural Stabilization and Conservation committee, and J. P. Benson, rancher, viewed the 1954 cotton allocation program. Several other speakers directed their reports to members interested in agricultural financing.

•

NPCA Names Spear

Dr. Philip J. Spear has been named to the post of technical director of the National Pest Control Association, Inc., succeeding Dr. Ralph E. Heal, who has been named to the office of executive secretary.

Meeting Calendar

March 22-14—Western Weed Conference. Tucson. Ariz.

March 24-26—National Agricultural Chemicals Association Spring Meeting. Shamrock Hotel. Houston. Texas.

March 24-27 — American Chemical Society. Municipal Auditorium. Kansas City.

March 25-26—North Central States Branch ESA. Hotel Paxton. Omaha. Neb.

April 13-14—Western Cotton Production Conference. Phoenix. Ariz.

April 13-14 — Fifth Annual Short course on insect and rodent control for sanitarians. Purdue University. Lafayette. Ind.

April 29-30—Cal. Fertilizer Assoc., 2nd Annual Conference. Moose Hall. Visalia. Cal.

May 4-6—Fertilizer Section. North Carolina. Annual Safety Conf., Sir Walter Hotel. Raleigh.

May 6-8—Fertilizer Section. Governor's Safety Conference. Lord Baltimore Hotel. Baltimore. Md.

May 21—Fertilizer Section. Va. Annual State-wide Safety Conf., Monticello Hotel. Norfolk.

May 23-25 — Chemical Specialties Manufacturers Assn., mid-year meeting. Netherlands Plaza Hotel. Cincinnati. O.

June 10-13—American Plant Food Council. The Homestead. Hot Springs. Va.

June 13 — Executive Committee. Fertilizer Section. National Safety Council. White Sulphur Springs. W. Va.

June 14-16—National Fertilizer Association. Greenbrier Hotel. White Sulphur Springs. W. Va.

June 21-22—Assn. Southern Feed & Fert. Control Officials. Skirvin Hotel. Oklahoma City. Okla.

June 22-24 — Pacific Slope Branch. E.S.A., Pilot Butte Inn. Bend. Ore.

June 28-29—North Central Phytopathological Meeting. Ames. Ia.

July 1-4—Plant Food Producers of Canada. Manoir Richelieu. Murray Bay. Quebec.

July 20-22—Pac. Northwest Regional Fert. Conf., Klamath Falls. Ore.

Sept. 8-10—National Agricultural Chemicals Association. Spring Lake. N. J.

G. A. ZEIGLER

Zeigler Directs Potash Assn.

Geore A. Zeigler, formerly with the Naco Fertilizer division of the W. R. Grace & Co., South Carolina was recently appointed managing director of the Potash Export Assn. Mr. Zeigler was chief chemist for the W. R. Grace Co. in Bolivia, S. A. from 1940-1944, then transferred to the industrial engineering department in New York, where he worked until 1946, and then transferred to the South Carolina post.

In his new capacity, Mr. Zeigler will direct the new expanded export program for the Potash Export Association.

•

Short Course for Sanitarians

The fifth annual short course in insect and rodent control for sanitarians and others connected with the food industry and public health will be held at Purdue University, Lafayette, Ind., April 13 and 14.

Meetings, to be held in the Memorial Union Building, will start at 9 a.m. Sponsoring the meeting are the Indiana State Board of Health, U.S. Fish and Wildlife Service and the Purdue Dept. of Entomology.

•

Davison Revises Research

New director of research and development at Davison Chemical Corp. is Dr. P. L. Veltman, who was advanced from manager of the Curtis Bay laboratories in a revised plan of organization for the company.

Dr. P. W. Bachman, vice president in charge of the division directed by Veltman, said Ralph E. Hope, formerly manager of research engineering has been made an assistant director, his duties including management of the laboratories. L. L. Baral succeeds Hope as manager of research engineering. Also named an assistant director is W. K. O'Loughlin, who formerly was manager of the development department.

In other moves, Edwin M. Glocker, formerly staff assistant to Dr. Bachman, was made manager of the research statistics department, a new post, while Luther O. Young heads the application research departments, another new post. Dr. Bachman's staff assistants are C. D. Helm and A. J. Antonious.

N. C. ESA Conference March 25-26 in Omaha

THE ninth annual conference of the north central branch of the Entomological Society of America will be held at the Paxton Hotel, Omaha, Neb., March 25-26. A full program will include reports on field crops, fruit, pollinating, ornamental insects, stored product pests, and various insect problems. Highlighting the conference will be the election of officers for '54-'55.

Goerge C. Decker, Illinois Natural History Survey, chairman of the group, will preside at the first general session, and introduce H. H. Ross, president of ESA. C. H. Hoffman will then report on the reorganization of the U.S. BEPQ, and H. B. Mills will discuss the "Relationship and Integration of Fields Within Entomology."

In the general session on economic entomology on Friday, March 26, C. C. Roan will discuss "The Evaluation of True vs Apparent Insect Resistance," and C. Kearns will outline "The Concept and Practical Value of Synergism." In this same session G. C. Decker will review "Methods of Making 'Guestimates' on Insect Losses" and B. A. Porter will report on "Viruses, Bacteria and Fungi in Commercial Insect Control."

In the past two years considerable interest has been shown in the stored grain program and problem. A report by states on the grain sanitation program is planned for the meeting. Other reports include that on the "Status of Grain Protectants" by D. Wilbur, and "The Work and Plans of the National Grain Sanitation Committee" by R. Smith. R. Latta will present a progress report on control of stored product insects.

"The Uses of, Materials for, and Limitations of Automatic Sprayers" is the subject of a paper to be presented by W. N. Bruce. A round-table discussion is planned on the formulation of a fly control program and control recommendations for 1954.

Sectional meetings will include the following speakers: *Field Crop Insects*: J. W. Ingram, F. G. Holdaway, R. A. Blanchard, J. T. Medler, C. R. Weaver, B. A. Haws, K. J. Starks, J. Bigger, L. K. Cutkomp, and G. E. Gould. A symposium on chemical control materials and results will be reported by J. W. Apple, J. H. Lilly, J. M. Hoerner and C. C. Burkhardt and H. R. Bryson; *Insects of Forests, Ornamentals:* A. C. Hodson, R. R. Whitten, R. B. Neiswander, and S. A. Graham; *Fruit Insects*: D. W. Hamilton, D. A. Dever, W. M. Hantsbarger, S. C. Chandler, and F. Sherman III; *Phylogeny and Evolution*: E. F. Cook, H. S. Dybas, J. B. Kitzmiller, A. R. Barr, and C. D. Michener.

Pollinating Insects: C. L. Farrar and R. J. Walstrom. *Teaching and Education*: programs will be outlined and discussed by H. Knutson, H. Deay, J. J. Davis, W. R. Horsfall, H. M. Harris, C. E. Mickel, C. D. Michener, and H. C. Severin; *Vegetable and Canning Crop Insects:* G. E. Gould, W. Luckmann, R. K. Chapman, A. G. Peterson, R. L. Post and F. L. McEwen.

Harold Gunderson, chairman of the program committee for this meeting, was assisted by C. C. Compton and M. Sanderson. The local arrangements committee consists of R. E. Hill, chairman, R. E. Rosell, C. Walstrom, R. Fux and E. Raun.

Fungicide for Calif. Smog

The University of California, Davis, Calif. citrus experiment station has discovered that a dithiocarbamate fungicide is effective against smog damage. Tests are being continued to determine how long the compounds are effective and whether the effect varies on different types of plants. Thus far, the spray has shown no adverse effect on plants.

•

Dorr Builds Two Plants

Two new chemical fertilizer plants, half a world apart are now in the process of design by the Dorr Co. of Stamford, Conn. Shin Nippon Chisso Hiryo K.K. plan to construct both a phosphoric acid and ammonium phosphate plant at Minimata, Japan, while Det. Norske Zinkkompani A/S will erect a phosphoric acid plant at Odda, Norway.

•

CFA Plans Conference

Many members of the fertilizer industry are expected to attend the second annual California Fertilizer Conference to be held in Moose Hall, Visalia, April 29-30.

Program for the conference is being planned by the Tulare and Kings County directors of the University of California Agricultural Extension Service and the Soil Improvement Committee of the California Fertilizer Association.

The CFA's part in the sessions will be highlighted April 30 by a program on phosphates, with J. H. Nelson, of Nelson Laboratories, Stockton, Cal., as chairman.

•

Jackson Joins Chipman

John M. Jackson will join the sales staff of Chipman Chemical Co., Inc., Bound Brook, N. J., March 15, with headquarters in the company's new plant at Bessemer, Ala. Jackson will handle agricultural sales in Alabama, Georgia, and parts of Florida and Tennessee.

•

Jones Joins Gen. Industries

Dr. Franklin D. Jones, widely-known in the agricultural chemical industry as a pioneer in work on weed killers through his patents on 2,4-D and 2,4,5-T, has joined the consulting staff of General Industries, Inc., Philadelphia engineering firm.

DR. FRANKLIN D. JONES

Mr. Jones was instrumental in helping to develop the agricultural business of the American Chemical Paint Co., which, through the Jones' patents, has become one of the largest handlers of herbicides, insecticides, plant hormones, fungicides and plant foods.

•

Cyanamid Appointments

Five appointments in its agricultural and mining chemicals department were announced this month by American Cyanamid Co.

Dr. F. L. Stark was named manager, Dr. J. F. Yost, agricultural chemical group leader, K. G. Nolan, agricultural biological group leader, N. Hedley, Cyanidation group leader and Dr. R. B. Booth, mining chemicals group leader.

•

Louisiana's First 2,4-D Plant

Bel Chemical & Supply Co., Inc., Houma, La. has announced the opening of its Schriever Plant for the formulation of 2,4-D Amine Weed Killer.

The completion of the plant, the first for this purpose in Louisiana, marks the entry of Bel Chemical into the manufacturing field. Distribution of agricultural chemicals, spraying equipment, and veterinary supplies will be continued.

The company's policy of extending a technical field service to its customers has been expanded.

Young Machinery Expands

The Young Machinery Company, Muncy, Penna. manufacturers of complete plant equipment for the insecticide industry, has just announced that ground has been broken for an addition to their plant which will double the size of their present facilities. The expansion program is expected to be completed shortly.

Mr. H. T. Young, president, states that this expansion will involve improved materials handling, fabrication, machining equipment which will result in reduced operating costs and greater savings to the customer. "While insecticide blending, mixing, and emulsion formulating equipment will continue to be one of our principal lines of equipment," says Mr. Young, "we have within the past few years found it necessary to develop new products to meet the needs of the chemical and allied industry. Such products now include our transvair air conveying systems, rotary air lock feeder valves, laboratory mixers, screw conveyors, and bucket elevators."

The expansion program of the Young Machinery Company will include modern facilities for the fabrication, grinding, cleaning and polishing of stainless steel, monel, and aluminum. A new overhead crane will further reduce material handling costs.

This overall program will also include the development of sales outlets throughout the United States and Canada.

•

Meadows Heads S.W. ACFA

New president of the Agricultural Chemical Formulators Association, Southwestern branch, is Dr. C. M. Meadows, of Waco, Tex.

Meadows, president and general manager of Southwest Sprayer and Chemical Co., also is legislative coordinator for the National Agricultural Chemicals Association and executive committeeman for the Entomological Society of America, Southwestern branch.

ACFA is composed of formulators in Texas, Oklahoma, New Mexico, Louisiana, Arkansas and Mississippi.

Arkansas Schools Fert. Dealers

The Arkansas Agricultural Extension Service recently conducted a series of local schools for fertilizer dealers throughout the state to aid dealers in providing advice on plant food needs and best fertilizer usage in their contacts with farmers.

Subjects covered in the schools included changes in fertilizer recommendations for Arkansas, soil types and soil responses to fertilizer, soil compaction problems in Arkansas, fertilizer problems in each area of the state, timing of fertilization, fertilizer placement, irrigation and organic matter. Sessions were held late in February and early March.

•

Plant Food Div. for Pac. C.

Pacific Coast Borax Co., Division of Borax Consolidated, Limited, has announced the establishment of a new Plant Food Division to be headed by Dr. James A. Naftel. Dr. Naftel will be responsible for the direction of sales and sales development in this division.

Prior to his new appointment Dr. Naftel was the southern agronomist for the company, and he will continue to direct the new division from his present office in Auburn, Alabama.

Dr. Naftel's chief fields of research have been in soil fertility investigations involving soil acidity, methods of analysis, need and use of lime, effect of soil reaction on the availability of trace elements with special reference to boron and, more recently, to applied research in production of certified seeds and grassland farming. He is the author of more than 25 scientific articles, papers, and bulletins relating to soil fertility and chemical methods of analysis which have been published in this country and abroad.

The Company pointed out that this new division has been organized because of the wide spread and increased use of their various products, including Fertilizer Borate, Colemanite, and Polybor. These products are used in mixed fertilizers, and for direct application in correcting and preventing boron deficiencies in the soil.

D. J. KEATING

R. A. LAMOREE

J. H. KENNEDY

Stauffer Advances Keating, Kennedy, Lamoree

Dan J. Keating has been appointed director of sales of the newly-organized Agricultural Chemicals Division of Stauffer Chemical Company, its subsidiaries and associated companies, it was announced by Hans Stauffer, executive vice-president.

Mr. Stauffer announced also the appointments of John H. Kennedy as eastern sales manager and Robert A. Lamoree as western sales manager of the Agricultural Chemicals Division.

Stauffer formed its Agricultural Chemicals Division to help meet demands resulting from the rapid growth and complexity of its national agricultural activities.

Mr. Keating was formerly manager of the pacific northwest division of Stauffer Chemical Company and started with the company in 1926 in the San Francisco plant. He will make his headquarters at the New York offices, 380 Madison Avenue.

Mr. Kennedy started in the chemical business in 1920 and joined Stauffer in 1940. He previously was associated with Mechling Brothers Division of General Chemical Company and Grasselli Chemical Company. Mr. Lamoree became associated with the American Cream Tartar Division in 1936 and was transferred to the Stauffer San Francisco offices in 1942 as sales manager of its Pacific coast activities. Mr. Kennedy will be headquartered in New York and Mr. Lamoree in San Francisco.

Amer. Cyanamid Ups Danton

Kenneth K. Danton, formerly general production superintendent at the Bridgeville, Pa., plant of American Cyanamid Company, has been appointed manager of the Azusa, Calif., plant of the company. He replaces Dr. W. N. Oldham, who has been assigned to the newly created post of technical director of the Cyanamid plant at Wallingford, Conn.

•

Co-op Builds N-Plant

A cooperative farmers' project is currently underway near Lawrence, Kansas, where a farmers' nitrogen fertilizer plant is under construction. The plant is expected to be in production in mid-July.

Grace Chemical Names Ronan

Frank J. Ronan has been named Chicago district sales manager for Grace Chemical Company. A graduate of Northwestern University, he was associated with Pittsburgh Coke & Chemical Co. in Chicago before joining Grace Chemical.

•

V-C to Occupy New Offices

The Virginia-Carolina Chemical Corp., makers of Vicara fiber and other industrial and agricultural chemical products, has leased office space for a long term of years in the new 26-story, air-conditioned office building being completed at 99 Park Avenue in New York City. Virginia-Carolina expects to move to its new quarters early in the spring.

MICHIGAN CHEMICAL CORPORATION

announces

WYANDOTTE CHEMICALS CORPORATION

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(TECHNICAL GRADE)

throughout the United States and possessions

Effective February 5, 1954, Wyandotte Chemicals Corporation was appointed sole distributor in the United States and possessions for Pestmaster Technical Grade DDT.

In the same area, Michigan Chemical Corporation will continue to sell its Pestmaster DDT formulations, including 75% and 50% Dust Concentrates, 75% and 50% Wettable Powders, and 25% Easy-Emulsifying Concentrate.

Michigan Chemical Corporation will handle the export of its Pestmaster Technical Grade DDT and all of its Pestmaster formulations throughout the world other than the United States and possessions.

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Saint Louis, Michigan

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Brownsville Center Dedicated

More than 3000 Brownsville (Tex.) citizens and guests attended the dedication ceremonies late in January of the new Pink Bollworm research center. Gov. Allan Shivers of Texas was among the guest speakers.

Other speakers included Dr. S. B. Fracker, assistant to the administrator of the Agricultural Research Service of the USDA; Cong. L. M. Bentsen, Jr., Mayor H. L. Stokely, Paul Mayfield, Hercules Powder Co., president of the NAC; Dr. H. J. Johnston, Memphis head of the research development for the National Cotton Council of America; and Dr. Clay Lyle, Mississippi Agricultural Experiment Station.

The dedication was hailed as a special event in Brownsville, with a feature edition of the local newspaper, and particular attention by local business concerns. Dr. F. C. Bishopp, formerly assistant chief of the B.E.P.Q., U.S.D.A., is coordinator of research at the new pink bollworm center.

•

Pesticide Program for Dealers

A nationwide program to help dealers increase sales and profits is now being launched by PAM—the Inter-Association Council of Pesticide and Applicator Manufacturers. This program will acquaint the public with the advantages of using the right pesticide with the right applicator at the right time for profits, comfort and health. The tools of the program are a 20" by 40" four color poster and an informative dealer booklet giving suggestions on merchandising pesticides, sprayers and dusters. The poster is shown on the front cover of this issue of *Agricultural Chemicals*.

PAM—the name adopted by the Inter Association Council—represents these trade associations: The National Agricultural Chemicals Association, The Power Sprayer & Duster Department of the Farm Equipment Institute, and the National Sprayer and Duster Association. The members of these associations are cooperating in this program.

A PAM insignia which will appear on the poster ties the dealer in with the Inter-Association Council activities, and the promotion and merchandising programs of the association members. The program is to be a continuing one and new publicity material to trade and consumer magazines will be released throughout 1954. The poster and booklet are available through the member manufacturers of these trade associations which make up the Council.

Midwest Shade Tree Conference in Chicago

By H. H. Slawson

THE Midwest Chapter of the National Shade Tree Conference, at its 9th annual meeting in Chicago, Feb. 17-19, heard progress reports on diseases and insect pests of trees and a memorable discussion of insecticide hazards by an outstanding entomological authority. Other program features dealt with trade problems of the tree care profession, such as state license laws to establish standards and control fly-by-night operators; how to gain favorable publicity for the industry; and how to capitalize on the aesthetic values of shade trees. Over 300 persons were registered for the affair at Chicago's Hotel LaSalle. A number of suppliers of equipment and materials, including chemicals for tree care, also presented displays of their products.

New president of the Midwest Chapter for 1954, elected at the business meeting, Feb. 18, is Dr. L. J. Tehon, head of the section on applied botany and plant pathology, Illinois State Natural History Survey, Urbana, Ill. Frank Hambury, president, Hambury Tree Expert Co., Peoria, Ill., was elected vice president, and Noel Wysong, chief forester, Cook County Forest Preserves, Chicago, was re-elected secretary-treasurer.

To counteract the adverse public attitude toward currently used insecticides, more education, rather than more legislation, is urgently needed, Dr. George C. Decker declared in his examination of "Facts and Fallacies About Insecticides." Dr. Decker is head of the Illinois Natural History Survey's section on economic entomology and president-elect for 1955 of the Entomological Society of America.

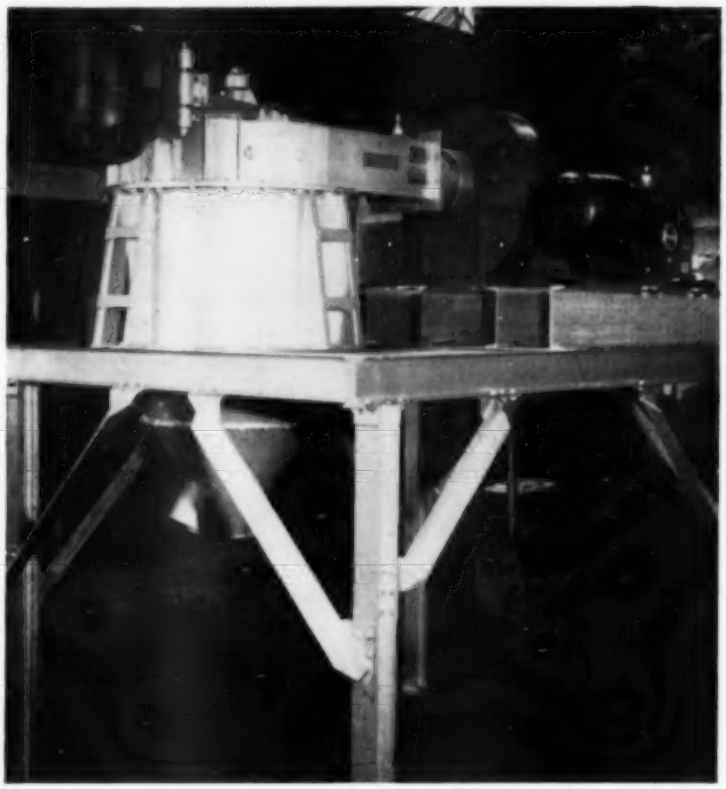
Adequate legal protection of the public is provided in two federal laws, Dr. Decker said. One, administered by the Food and Drug Administration, covers the protection of foods and the other is the Insecticide, Fungicide and Rodenticide Act, administered by the USDA, regulating use of agricultural chemicals, he explained. In forbidding interstate commerce in toxic compounds unless registered and supported by proof from the manufacturer, that they are not hazardous if used as recommended, these two statutes, he declared, "put us on safe ground."

"If people can be made to understand more fully how these safety measures protect them," he said, "there would be less clamor against these substances so vital to the nation in many ways."

Dr. Decker made no effort to minimize the inherent hazards of insecticides. The increasing number of chemical compounds available today, he said, warrants close attention to all possible hazards in their use. But, he added, entomologists and toxicologists are agreed that, if proper safeguards are used, no insecticide today is unsafe. There is great need, he continued, to emphasize the distinction between the terms "hazard" and "toxicity." Toxicity, he defined as "the capacity of a substance to produce harm," while "hazard" entails the "probability that it will produce harm." Toxicity, he contended

NEW TYPE STURTEVANT AIR SEPARATOR

Recovers Fines in Micron Ranges



Now the famous Sturtevant Whirlwind Air Separator, so widely used throughout industry for fast recovery of fines, has been specially designed to "pick-off" classified materials such as pigments, limestone fillers, plastics, oyster shells, etc., in micron sizes.

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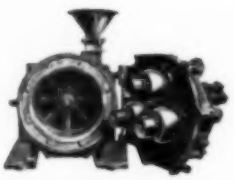
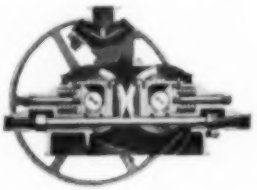
A fluid jet grinding machine, the Sturtevant Micronizer speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired.
Sturtevant Micronizer grinding machines are available in many sizes and capacities.



RING-ROLL MILLS
For medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



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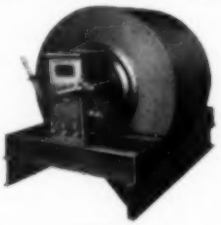

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Four-way mixing action assures a thoroughly blended product. Open-door accessibility permits easy cleaning. Available in many mixing capacities for ½-ton per hour and up.

is not necessarily related to hazard. For example, it is safe to spray a grain storage bin with DDT for insect control before the bin is filled up, but it would be unsafe to use DDT in the grain itself.

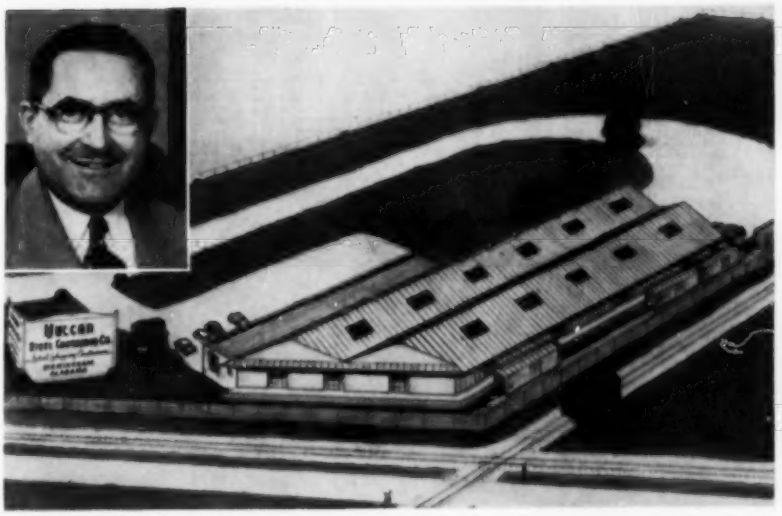
All users of insecticides, he continued, must be responsible for a familiarity with the properties of a compound, the required precautions to take in its use and the antidote to employ in case of trouble. The whole subject of insecticidal poisoning, he also pointed out, is new to most doctors.

Dr. Decker outlined suggested precautions to take in handling the three main groups of insecticides . . . the organic phosphates, chlorinated hydrocarbons and those of botanical source. He distributed to those at the conference a series of tables, published in 1947, which list the levels at which some insecticides become dangerous or fatal. Damage claims filed for alleged injury due to insecticidal drift, Dr. Decker asserted, are unjustified. There is little basis in fact, he declared, for arguments that a person became violently ill or that an animal half a mile away was killed by the drifting dust. "It requires several days to produce such effects," he said. "In one of our tests it took us 28 days to kill a hog with an insecticide and then we had to administer the compound in capsules.

"There's a lot of talk now about dieldrin. We're told it is too dangerous to use. Usually its recommended use is one-fourth of a pound per acre. To get a fatal dose a steer would have to eat 30,000 milligrams. He'd have to eat it all in one meal and that means he'd have to eat all the vegetation on the acre of land."

Discussing the effect of insecticides on wild life, Dr. Decker said, if recommendations are adhered to, there is little danger that birds or animals will be affected. As to soil contamination, he pointed out that the materials disappear quickly through evaporation or other ways. In general, he said, normal usage does not cause any rapid build-up of large deposits in the soil.

(*Turn to Page 145*)



Modern fireproof building where Vulcan Steel Container Co. makes steel pails and drums, with a special line for the agricultural chemicals industry. Gordon D. Zuck (insert) heads the Birmingham, Ala. firm.

Steel Pails for Pesticides

MANUFACTURING a line of pails and drums for the agricultural chemicals field is part of the fast-growing business of Vulcan Steel Container Co., of Birmingham, Ala. Gordon D. Zuck, president of Vulcan, says supplying five-gallon containers to the industry is a growing part of the young business, started in August, 1952. A special one-gallon drum is manufactured for chemical concentrates, he stated, and a long list of fertilizers, insecticides and fungicides are packed in the five-gallon containers. The company also makes a special dispensing tank for applying soil fumigants.

Mr. Zuck declares the plant is the first and only company devoted exclusively to the manufacture of a full line of steel pails for users in the South. Formerly vice president of one of the country's oldest steel container manufacturers, Mr. Zuck has 20 years background in the business.

Vulcan is making containers for many fields, ranging from one to eight gallons in size. They are furnished with full removable lug covers or in closed-head, drum-type. The company offers all the popular pouring openings to meet the special needs of the agricultural chemical industry.

Recognizing the need for corrosion-proof material for many products, including some agricultural emulsions, Vulcan manufactures a wide range of protective lacquer linings which are baked on to the containers. They protect against discoloration and decomposition in addition to corrosion.

Vulcan also offers new lithographing facilities for furnishing customer's trade marks, labels and product directions for use on the drums. The firm supplies important manufacturers and processors in most of the South, with production geared to a large daily volume.★★

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Bauxite Supplier Sold

The Attapulgus Minerals & Chemicals Corporation, Philadelphia, has bought the American Cyanamid Company's one-half interest in the Porocel Corporation, making the latter a wholly-owned Attapulgus subsidiary, it was announced late in January. Porocel operates a plant at Berger, Ark., making products for the bauxite, absorbent and catalyst markets. It has concluded a long-term bauxite supply contract with American Cyanamid.

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FIRST to develop new DIRECT GROUND SPEED DRIVE. Eliminates gear reduction cases, power take-offs, hanger shafts, bearings, etc., eliminates 75% of replacements. Doubles spreading speed. Does away with "spotting" due to variations in speed and gear-shifting.

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15. FIRST to use alloy steel in spreader bodies.
16. FIRST to pioneer fertilizer spreading with "V" type body.
17. FIRST to develop cross type fertilizer and fine lime spreader (Model "O").
18. FIRST to develop hood type spreader; (used in Europe for several years) before introducing in competition with Model "O" spreader for wind control of powdered lime and fertilizer.
19. FIRST and only hood to direct spread to ground, tapering spread for perfect lapping, instead of stopping material and leaving heavy streaks.
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Increased FERTILIZER USE Discussed at Mid-West Soil Improvement Conference

By
H. H. Slawson

President of the Middle West Soil Improvement Committee A. H. S. Vorhes, and J. D. Zigler, member of the board of directors.

THE Middle West Soil Improvement Committee's 6th annual joint meeting of college agronomists with the fertilizer industry brought over 500 persons, including college scientists from thirteen states, and representatives of the fertilizer manufacturing and equipment industry to Chicago's Palmer House Feb. 19, for discussion of factors affecting the use of fertilizers.

The educators on the one hand told the manufacturers what they have been doing to encourage increased profitable use of fertilizers by farmers and the manufacturers, in turn, reported on their efforts to provide adequate supplies for the coming crop season. The dealer's place in the distribution system received considerable attention. Another highlight was a hard-hitting discussion of the fertilizer industry's future as viewed by one college administrator.

Dr. George E. Smith of the Univ. of Missouri, outlined the Missouri accelerated soil testing program aided by 89 testing laboratories throughout the state and told what is being done to encourage increased and effective use of fertilizer in that state. "Caught in the price-cost squeeze, the farmer is faced with the need to cut his unit production costs," Dr. Smith said. "He can't afford to use any unneeded plant nutrients and soil tests are the only way to determine what the fields need." He explained the exchange reactions between soil organic matter and chemical nitrogen, and outlined the Missouri method for calculating how much additional nitrogen a given soil requires to get optimum response from the crop.

The principal weakness in soil tests, Dr. Smith said, is the use of soil samples that are not representative. Laboratory procedures produce fewer errors, however, and, unless the sampling errors are reduced, he could see no purpose in refining laboratory procedures.

Continuing the discussion, Dr. John Hanway, Iowa State College, reported that correlating the soil test information with crop response involves consideration of what may be profitable rates of application in practice. Testing, he said, does not simplify the making of recommendations, but makes them more accurate.

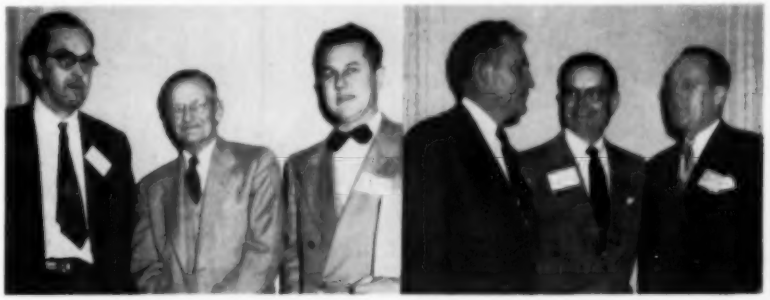
Dr. K. C. Berger of the Univ. of Wisconsin offered a graphic account of how the college soils testing service writes "prescriptions" for ailing farm soils in that state. He related that at one time, some farmers used a "prescription" intended to produce 100 bushels of corn per acre but ended up with 124 bushels. On the average, however, production based on a prescription for a 100 bushel crop has resulted in 102 bushels to the acre. The "prescription" idea has caught the imagination of the farmers, he said, and it has been highly successful. Farmers have been extremely interested because they are told exactly what to do to get results sought. With the prescription it is easy to get them to use fertilizer.

Since establishment of the Minnesota state soil testing laboratory, over 20,000 soil tests per year have been made for farmers of that state.

(*Turn to Page* 147)

Left: Z. H. Beers, executive secretary of the Middle West Soil Improvement committee, N. T. White, Smith Agricultural Chemical Company, and W. P. Martin, Ohio State University.

Right: Russell Coleman, National Fertilizer Association; H. E. Myers, Kansas State College, and P. T. Truitt, American Plant Food Council.



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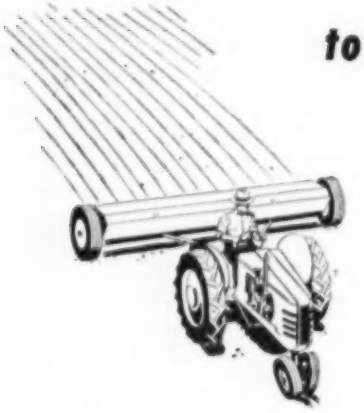

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REPUBLIC AMMONIUM SULPHATE

Meeting Date Changed

Meeting date for the Southwest Fertilizer Conference has been changed from July 8 and 9 to July 22 and 23, to avoid conflict at the Buccaneer Hotel, Galveston, Tex., with another meeting. The change was announced by J. F. Fudge, Texas state chemist, who is chairman of the technical and control group of the Conference.

•

Conn. Vegetable Growers Meet

More than 250 Connecticut vegetable growers attended the annual New Haven County vegetable meeting, held (Feb. 4) at The Connecticut Agricultural Experiment Station, New Haven. Those attending heard a series of talks covering several practical phases of vegetable production in a program arranged jointly by the New Haven County Extension Service, the Connecticut Vegetable Growers Association and the Experiment Station.

Dr. Edward J. Rubins, of the Department of Agronomy, University of Connecticut, told the assembled growers that there are four new general trends in fertilization of vegetables. The first is the use of higher analysis fertilizers; 8-16-16 formulas are now more popular than 5-10-10, for example. Secondly, he said, more growers are using soluble fertilizers with very high nutrient content. A third trend is the use of foliar sprays, where nutrients are applied as sprays to the leaves.

A talk by Neely Turner, head of the Entomology Department at the Experiment Station, stressed the necessity for exercising caution when using some of the new phosphate insecticides. Goggles, a respirator, and clothing that covers all areas of the skin are essential, he said, if the spray operator is to be adequately protected.

"Growing Early Plants" was the subject covered by Dr. W. C. Kelly, Cornell University, who offered several suggestions for successful growing of young plants in flats for later transplanting to the field to meet the early market demand. Among these were: selection of early-maturing varieties, adequate control of insects and diseases in the greenhouse, addition of organic matter to make the soil looser, moister and more friable, avoidance of over-fertilization, which may burn plants, and allowing enough space for good growth.

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Food Machinery Consultant

Dr. William L. Davidson has been appointed a full time consultant to the Food Machinery & Chemical Corp., New York, according to an announcement by Ernest Hart, executive vice president. Dr. Davidson, until January 1st of this year, had been director of the office of industrial development of the Atomic Energy Commission in charge of disseminating AEC technical data.

•

Wyandotte DDT Distributor

Announcement has been made by Michigan Chemical Corporation, Saint Louis, of the immediate appointment of Wyandotte Chemicals Corporation, Wyandotte, Michigan, as its exclusive distributor of Pestmaster Technical Grade DDT (dichlorodiphenyl trichloroethane) in the United States, Hawaii, Puerto Rico, and Alaska.

"Michigan Chemical," said Theodore Marvin, president, "will continue distribution of its Pestmaster DDT formulations in the same areas, as well as technical DDT and formulations in export."

This arrangement provides Wyandotte Chemicals with an important source of quality DDT, and rounds out its series of agricultural products, which now includes lindane and BHC, and wetting agents, solvents, fumigants, emulsifiers, and soil conditioners. These products are under the sales direction of Charles F. Gerlach, sales manager, inorganic and agricultural chemicals, at Wyandotte.

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Omission Noted

In our February issue, we failed to note that the feature "Radioactive Isotopes in Fungicidal Research" was co-authored by Paul R. Miller. The studies were conducted by Dr. S. E. A. McCallan, whom we listed as the author, and Dr. Miller at the Boyce Thompson Institute in Yonkers, N. Y.

Beetle Areas Regulated

In an order of the U. S. Department of Agriculture effective February 1, 1954, white-fringed beetle regulated areas have been extended to include for the first time parts of the following counties found infested during the summer of 1953: Houston County, Alabama; Attala, Clarke, Jasper, and Leake Counties, Mississippi; and Beaufort County, South Carolina. Additional areas have also been added to those already under regulation in Baldwin, Coffee, Geneva, and Monroe Counties, Alabama; Jackson County, Florida; Macon County, Georgia; Perry County, Mississippi; and Onslow County, North Carolina.

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Clines Joins AmPotash

Appointment of Wm. M. Clines to the position of western sales manager of the heavy chemicals division of American Potash & Chemical Corporation was announced in Los Angeles last month by Wm. J. F. Francis, general sales manager, western.

Clines, whose appointment was effective February 1, will be based at the company's Los Angeles executive headquarters. He will be responsible for the activities of the heavy chemicals sales force and product supervisors in that group, including those of borax compounds, potash, soda ash, salt cake, lithium, bromine chemicals and phosphoric acid.

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New Calif. Ammonia Plant

An engineering contract for planning a new nitric acid and ammonium nitrate plant has been awarded to C. F. Braun & Company, by Brea Chemicals, Inc., subsidiary of Union Oil Company of California.

The proposed plant will cost about $2,500,000 and be located adjacent to the $13,000,000 ammonia plant now under construction at Brea for the Amoniaco Corporation. The ammonia plant, which is leased and will be operated by Brea Chemicals, Inc., is scheduled for completion early in April. Most of the initial output of ammonia will be marketed as aqua ammonia fertilizer solution in the principal farm areas of the West, Hawaii and Mexico.

WHEN YOU BUY Niagara YOU BUY PROTECTION

Your One Source

FOR ALL THESE MONEY MAKING COTTON MATERIALS

INSECT CONTROL ... WEED CONTROL ... DUSTERS

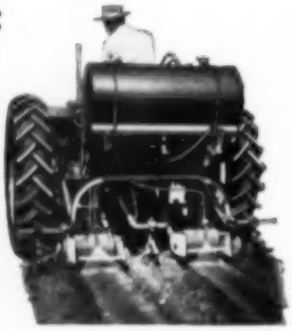
COTTON DUSTS AND SPRAYS

Niagara has had 50 years experience in the production of insecticides for cotton. No matter what the threat or infestation there is a superior Niagara dust or spray formula available to combat and control it. All Niagara cotton materials are carefully compounded under strict laboratory control to provide the highest degree of effectiveness. They have been thoroughly field-tested and are approved and used by leading cotton planters throughout the south.

COTTON DUSTERS

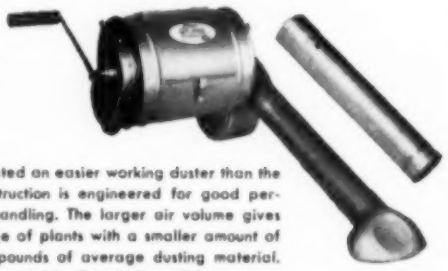
Niagara makes cotton dusters in several specifications to suit the needs of every cotton grower. The model AA power take-off Niagara duster (illustrated above) is designed for tractor mounting. A two wheel engine drive trailer type is also available. For the small planter there is the Niagara Cyclo-Junior hand duster. The combination of a reliable Niagara duster and effective Niagara dusts can't be equalled for keeping cotton fields insect-free.

CHLORO IPC MISCIBLE



This thoroughly tested and approved herbicide gives young cotton a four to six week weed-free start. It is applied to seed beds at planting time by spraying equipment mounted on the planter (see illustration). For economy only a narrow band of soil 12" wide needs to be treated. Niagara Chloro IPC Miscible saves costly hand hoeing. It enables young cotton to germinate, sprout and flourish without fighting the weeds for nourishment and moisture.

CYCLO-JUNIOR CRANK DUSTER



You have never operated an easier working duster than the Cyclo-Junior. All construction is engineered for good performance and easy handling. The larger air volume gives more uniform coverage of plants with a smaller amount of dust. Holds about 9 pounds of average dusting material. Two row attachment available. This duster will have many uses around your farm and home—use it in the field, garden, barns and around the lawn for all insect control.

NIAGARA FIELD SERVICE

The Niagara representative is a good man to know. He lives in your neighborhood, understands local growing problems and infestations, *talks your language*. He can help you grow a more productive and profitable crop of cotton. Call upon his knowledge freely and without obligation.

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Niagara CHEMICAL DIVISION

Food Machinery and Chemical Corporation

Middleport, N. Y., Richmond, Calif., Jacksonville, Fla., Tampa, Fla., Pompano, Fla., Wyoming, Ill., New Orleans, La., Ayer, Mass., Greenville, Miss., Harlingen, Tex., Pecos, Tex., Yakima, Wash. Subsidiary: Pine Bluff Chemical Co., Pine Bluff, Ark. **Canadian Associate:** NIAGARA BRAND SPRAY CO., LTD., Burlington, Ontario.

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AS WE GO TO PRESS . . .

CONTINUOUS PROCESS REPORTS — INDUSTRY TRENDS HIGHLIGHT FERTILIZER SYMPOSIUM

ADDRESSING the more than 1100 registrants at the meeting of the American Institute of Chemical Engineers held March 7-10, at the Hotel Statler, Washington, D. C., undersecretary of commerce, Walter Williams, reported that "many of the country's future needs can be met by extracting nitrogen from the air to make fertilizer," emphasizing the national interest in the fertilizer industry.

The final day of the three-day meeting included a symposium on "Chemical Engineering in the Fertilizer Industry," at which six technical reports were presented on the trends in the fertilizer industry, factors influencing the changing technology of the industry, descriptions of continuous processes for the production of granular mixed fertilizers, superphosphate mixtures, and the chemical urea process.

In reviewing the trends in the fertilizer industry, E. C. Kapusta, National Fertilizer Association, Washington, D. C., pointed out to the membership that current fertilizer consumption might well be doubled if farmers employed the quantities recommended by the agricultural colleges. In most areas, farmers are inclined to use less than half the amount of fertilizer recommended.

Mr. Kapusta summarized the principal operations of the industry as: the manufacture of synthetic or by-product nitrogen compounds; the mining and processing of phosphatic materials and potassium compounds, and the combination of one or more of the plant food carriers into mixed fertilizers. He pointed out that the most prominent contribution of the chemist and chemical engineer to the technology of fertilizer manufacture is the development of processes for the fixation of atmospheric nitrogen into nitrogen fertilizers. Also, that the nitrogen expansion program now under way stresses the increased production of the more concentrated nitrogen carriers; new production is expected to be largely in the form of ammonium nitrate, followed in order of descending importance by urea, ammonium phosphates and ammonium sulfate. Only minor increases, if any, in the production of other solid nitrogen compounds are presently indicated.

Considering the other two main fertilizer materials, Mr. Kapusta reported that according to a recent survey, the nation's production capacity is approximately 3 million tons of available P_2O_5, and that present expansion in domestic potash production facilities will provide farmers with their increased needs of this plant nutrient (major part will be in form of high-grade potassium chloride).

"At present, fertilizer mixtures are compounded almost exclusively by batch mixing methods, however, that progress in the application of continuous processing is being made." (Other papers dealing with some of these continuous processes were presented later in the symposium). Mr. Kapusta reported that granulation is the method currently gaining the widest application, and is one of the most significant technical advances. Some 45 plants, located chiefly in the Midwest are now employing or installing granulation processes.

Continuous Ammoniator

L. D. Yates, of the Tennessee Valley Authority, Wilson Dam, Ala., presented a report on "A Continuous Ammoniator for Superphosphates and Fertilizer Mixtures," which he co-authored with F. T. Nielsson and G. C. Hicks. The unit is designed so that large proportions of neutralizing ammonia can be incorporated in superphosphate and fertilizer mixtures without excessive losses of ammonia or P_2O_5 availability. It has been used successfully with standard nitrogen solutions and with liquid and gaseous anhydrous ammonia.

The underlying principle upon which the ammoniator works is the introduction of the ammoniating medium, which may be a nitrogen solution or gaseous or liquid ammonia, under a bed of fertilizer that is being rolled in a cylinder. The rolling bed within it promotes granulation when the proportions of liquid and solid phases in the fertilizer are in the proper range. Air may be blown onto the bed in the ammoniator to remove moisture from the surface of the particles and from the atmosphere above the bed, thereby preventing excessive agglomeration in some mixtures that tend to become very wet during ammoniation. Mr. Yates indicated that tests of the ammoniation of mixtures in the present pilot-plant ammoniator are continuing.

Ammonium Nitrate Manufacture

J. J. Dorsey, Jr., Commercial Solvents Corp., Terre Haute, Indiana, outlined a "Pilot Plant Study of a New Process for Manufacturing Ammonium Nitrate," reporting that this process differs from conventional ammonium nitrate processes in requiring no drying or cooling equipment, no crystallizers or prilling tower, and operation being practically independent of the weather conditions. The process incorporates recovery equipment for the ammonium nitrate produced in the grinding and classifica-

tion stages as well as the ammonia and ammonium nitrate which would be lost from the reaction stage.

Briefly, the process involves reacting preheated ammonia and nitric acid to produce ammonium nitrate and steam which are separated to give a relatively dry ammonium nitrate. This molten ammonium nitrate is dried by passing through a stripping column counter-current to air where the moisture is reduced to less than .3 per cent. The molten ammonium nitrate is solidified on continuous water-cooled stainless steel belts, from which it passes as a continuous sheet through a series of breakers, which reduce the product to a $-5 + 20$ mesh particle size.

Granular Mixed Fertilizers

ANOTHER continuous process considered at the symposium was described by S. J. Martenet, E. Rauh and Sons Fertilizer Co., Indianapolis, who presented the paper on "A Continuous Process for Production of High-Analysis Granular Mixed Fertilizers of High Ammonium Nitrate Content." The process consists of mixing continuously, in a paddle mixer, an ammonia-ammonium nitrate solution, superphosphates, and potassium compounds. After screening and heating, the slurry is mixed with recycled material and air-cooled . . . the material is then passed through a nodulizing cylinder and dryer. The product is granular, dry and homogeneous.

The process produces all ratios of fertilizers in a very high degree of plant food concentration; and allows a wide range of particle sizing. The fertilizers so produced are said to store over indefinitely long periods in bulk or bags without fear of cementing together even when piled 20 bags high or in silos a hundred feet in height. This assures perfect drilling condition in fields.

Large savings are made in the cost of nitrogen by utilizing low cost ammonia and ammonium nitrate solutions as the sole source of nitrogen; savings are made also in the cost of pentoxide, because the high concentration of ammonia and ammonium nitrate permit a larger proportion of pentoxide to be derived from lower cost normal superphosphate. Another advantage of the process is that no period of curing is necessary, allowing greater turnover of storage, and saving of storage facilities and costs.

Chemical Urea Process

AFTER reviewing five commercial processes for urea now in operation, Lucien H. Cook, Chemical Construction Corp., New York, described the Chemico process, which uses an excess of ammonia: to increase the quantity of urea per pass, . . . to reduce the quantities of ammonia and carbon dioxide which must be recovered and recycled, . . . and to reduce the quantity of carbamate which has to be decomposed. Mr. Cook pointed out, however, that operating with an excess of ammonia requires additional equipment, such as a separator, condenser and additional pump capacity.

Principal features and advantages of the Chemico process were listed as:

(1) 76% conversion of carbamate to urea per pass by use of excess ammonia. This conversion being almost twice that obtained in other commercially available processes.

(2) A simple method of recovering and recycling excess ammonia by condensation with normal cooling water without the necessity of additional compression.

(3) A simple method of recovering and recycling the ammonia and carbon dioxide obtained from carbamate decomposition. The quantities of ammonia and carbon dioxide to be handled per ton of urea being much less than in other commercially available processes.

Mr. Cook considered also economical phases of plant investment and operating requirements, detailing materials, utilities and labor needed, and discussing points to be considered in installation of a urea plant.

Factors Affecting Fertilizer Industry

A REPORT on the "Factors Influencing the Changing Technology of the Fertilizer Industry" prepared by F. A. Retzke, G. F. Sashsel and R. B. Filbert, Jr., Battelle Memorial Institute, Columbus, O., was presented by Mr. Filbert, who after reviewing fertilizer consumption and production reminded his listeners that "a realistic appraisal of the fertilizer market should consider these two possibilities: (1) food consumption over the next twenty years may increase no more than 20 per cent; and (2) fertilizers may have to compete with insecticides, weed killers, and disease-resistant plants in furnishing this increase in food production.

Discussing various cost factors involved in fertilizer production, Mr. Filbert pointed out that the cost of raw materials and distribution make up almost 90 per cent of the cost of the fertilizer, suggesting that changes in technology might be aimed at reduction in these two areas. He reported also that no drastic reduction in the cost of potash seems to be in sight, and that attention has been focused on the phosphatic materials, because the greatest room for improvement seems to lie here. Fillers or conditioners have to be considered quite seriously, he added, because they do fulfill the function of reducing caking in conventional goods.

In discussing processing costs, Mr. Filbert reported that these may be reduced without changing the composition of the product, merely by converting from a batch to a continuous process. Labor savings may also be expected.

Mr. Filbert presented tabular and graphical data on trends in consumption, production, cost factors in production, etc.; and compared costs of some current commercial processes with newer processes. Mr. Filbert indicated also that the "capital needed for any process improvement, ranged from about $25,000 for a continuous ammoniator, to over $6 million for a nitric phosphate plant. It is interesting to note that the return on the investment for a 50,000-ton-per-year nitric phosphate plant is less than for a conventional plant of the same capacity . . . however, no accurate figures are available, comparing the return on investment for these two processes for a 200,000-ton-per-year plant.

Panel discussing chemical weed killers: Merton Miller, Birds Eye General Foods, Albion, N. Y.; Lloyd Curtis, GLF representative; and Robert Sweet, Cornell Univ., Ithaca.

N. Y. Raw Products Conference Held at Geneva

THE 29th annual Raw Products Conference on the production of vegetable crops for processing was attended by more than 200 members and guests at Jordan Hall, New York State Experiment Station, Geneva, N.Y., February 9th and 10th. A joint program arranged by the agricultural committee of the New York State Canners and Freezers Association and the research and extension staffs at Geneva and Cornell Univ., included discussions on weed control problems, insecticide residue questions, disease control studies, fruit and vegetable pests.

Section chairmen, presiding at various sessions, were as follows: W. Tylor, Curtice Bros. Co., Bergen, N.J.; C. Smith, Gerber Products Co., Rochester; A. Hamson, Cornell Univ., Ithaca; E. Keech, Welch Grape Juice Co., Westfield, N.J.; and D. Searle, Victor Food Corp., Victor, N.Y. J. Luckett was in charge of publications.

In a discussion of chemical weed control, R. D. Sweet, Cornell Univ., pointed out that chemicals for weeding vegetables should be used in conjunction with normal cultivation practices, not as a replacement for all cultivation. He then reviewed the herbicide recommendations for various crops, offering a mimeographed supplement to the Cornell Extension Bulletin #769, which brings up to date data on the new weed killers.

CMU applied at 2 lbs./acre is reported to control a wider range of weeds in asparagus crops, for a longer period of time than any of the chemicals used previously; Stoddard solvent is suggested for carrots, although it does not control ragweed; some reports of injury to vine crops where Alanap-1 was applied, suggest controlled use of this herbicide . . . it is cautioned that no more than one 4-pound application be made on any given crop; pea growers are advised to make applications of "Premerge" or "Sinox P.E." at rates suggested by the manufacturer; and chloro-IPC is reported to be effective in controlling purslane in onions.

A paper submitted by W. C. Kelly, Cornell Univ., on fertilizing processing crops, included a table of fertilizer recommendations for various vegetable crops; and recommendations on nitrogen sidedressing. In reviewing the minor elements for processing crops, he pointed out that New York soils, in general, contain enough minor elements for most crops. The discussion on minor element deficiencies shows that when the soil reaction falls below pH 5.5, a magnesium deficiency may occur on all crops. In very acid soils, whip-tail may be found in cauliflower and broccoli; this is a symptom of molybdenum deficiency. When the soil reaction is higher than pH 6.8, manganese and boron may become limiting. A boron deficiency is most likely to occur on beets, cauliflower and broccoli. Manganese deficiency may occur on beets, beans, and tomatoes on light soils above pH 7.0.

M. C. Bond, Cornell agricultural economist, reported to members that the agricultural outlook for 1954 is "anything but bad."

E. D. Markwardt, extension agricultural engineer, distributed a series of spray tables for high pressure disease spraying, giving discharge rates based on new nozzles with drilled discs. Pump capacities required for various numbers of nozzles, and a calibration chart were included also.

Other valuable bulletins offered the conference were (1) an irrigation guide; (2) an 18-page notebook of 1954 spray and dust recommendations for fruit insect control in New York State; and (3) a 9-page notebook of 1954 recommendations of fungicides for fruit.

Reports on the production of individual fruits and vegetables for processing were included in the program. New equipment, soil testing, crop surveys were still other phases of reports offered at the two-day meeting.

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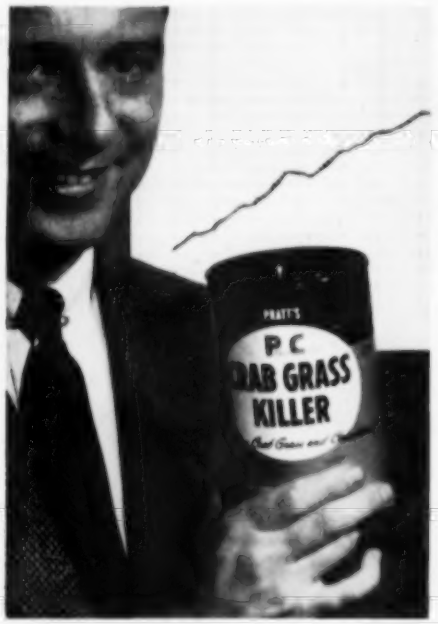
Lion Reports Sales Increase

Sales and operating revenues of Lion Oil Company, El Dorado, Arkansas, for the year 1953 were $89,959,405, a new high in the history of the company. For the year 1952 the company reported sales and operating revenues of $88,625,282.

Net income for last year, after all charges was $10,688,260, equal to $3.46 per share on 3,090,890 shares of common stock outstanding, and compared with $10,211,425, or $3.30 per share for the year 1952. Provision for taxes was $6,237,000 in the latest year, versus $6,331,000 in 1952.

packaging news... by HARCORD

Bug Blaster's self-dispensing pump gun, has sparked increased demands for this Sherwin-Williams' insecticide. Company states that this Harcord engineered paper package is convenient, effective and has gained unusual consumer acceptance.



Field reports chart a steady rise in sales of Pratt's Crab Grass Killer. Competitively priced paper packaging by Harcord in bright red and black stressing product uses, has proven a strong factor in the sales climb. At Harcord, we feel that our attention to detail and timing has served this product well.

To combat apple scab blight, Coromerc's fungicide ranks with the best. This product, distributed by Corona Chemical Division of Pittsburgh Plate Glass, is packaged in Harcord paper canisters. We're proud to be of service to a superior product marketed by a great company.

D & P Tomato Dust, a famous fungicide, manufactured by Doggett-Pfeil Company, moved ahead to better display position as a result of Harcord's pump-gun self-dispensing paper canister. Here is a case in point where the packaging proved a boon to a good product.

HARCORD MANUFACTURING CO., INC., *PAPER CANISTERS*

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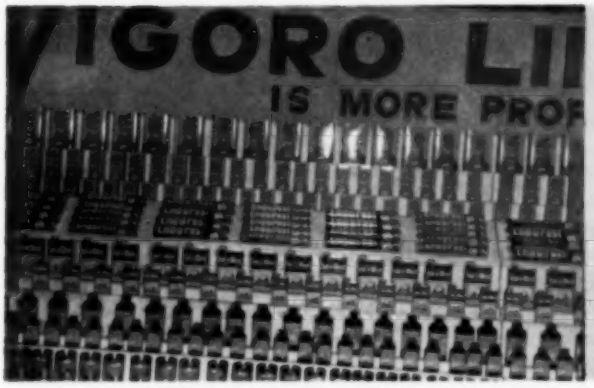
250 Competitors for

Monsanto: Bogey, D-Leet and Folium.

American Cyanamid: For lawn and garden.



Swift: Vigoro and the End-o line.

American Ag. Chem.: For special purposes.

the Green Thumb

THERE were lots of new gimmicks and gadgets at the record-breaking National Garden Supply Trade Show in New York City last month, but basically, the only big change from previous shows was the increased optimism of the exhibitors, who are looking for the biggest sales year in history for the small package line aimed at the amateur gardner.

Manufacturers of lawn furniture, fireplaces, barbecue units, trellises, pottery and sundry other fringe items all are trying to cash in on the booming home garden hobby, judging by many of the 206 exhibits which jammed the 71st Regiment Armory Feb. 2-4.

Basis for the optimism, however, comes from the fertilizer and pesticide companies, who, while they aren't marketing many new products for 1954, are redesigning their packages and placing emphasis on complete lines of plant foods and pest control chemicals for the coming season.

Home gardening already is a billion-and-a-half dollar business each year, with outlook good for a $2,000,000,000 figure in 1954.

The New York program, sponsored by the *Garden Supply Merchandiser* magazine, was the ninth national show. It concluded the current series which included shows at Long Beach, Cal. and Chicago. (For a report on the Chicago show, see AGRICULTURAL CHEMICALS, February, page 51.) More than 5,000 dealers were estimated to have attended the three-day N.Y. exhibition.

Among the exhibitors were these industry members, who displayed complete lines of garden products:

American Agricultural Chemical Co., New York City; American Chemical Paint Co., Ambler, Pa.; American Cyanamid Co., New York City; Armour Fertilizer Works, Carteret, N. J., Black Leaf Products Div., Virginia-Carolina Chemical Corp., Richmond; California Spray Chemical Corp., St. Louis; E. I. DuPont de Nemours & Co., Wilmington; Kelly Agricultural Products Co. Div., Summers Fertilizer Co., McKeesport, Pa.; Niagara Chemical Div., Food Machinery & Chemical Corp., Middleport, N. Y. and Swift & Company Plant Food Div., New York.

New Baker Import Facilities

The establishment of the seventh and final link in its chain of South Atlantic and Gulf Coast facilities for pier side storage and packing of "Nitralime" fertilizer was announced recently by Bradley and Baker, New York, importers of fertilizer materials. The previously established facilities are located in Norfolk, Va., Wilmington, N. C., Savannah, Ga., Pensacola, Fla., Mobile, Ala., and Gulfport, Miss. Operation of the last facility in the Port of Charleston, South Carolina, was initiated with the arrival of over a half-million dollars worth of "Nitrolime" from Holland, via the steamer, "Ardea".

The initial Charleston cargo produced between 200,000 and 220,000 one hundred pound bags of Nitrolime, with a current wholesale market value of $51.25 per ton.

An inspection tour of the entire installation was sponsored by Bradley and Baker for members of the fertilizer industry, representatives of various Charleston port interests, and the press, followed by a reception and dinner at the Frances Marion Hotel.

ACS Meets March 24-27

The division of agricultural and food chemistry of the American Chemical Society will hold its meetings March 24-27 at the 125th annual convention of the Society in the Municipal Auditorium, Music Hall, Kansas City, Mo. Scheduled for the meeting are various plant trips, including visits to Armour & Co., Spencer Chemical Co. and Standard Oil Co. of Indiana. The program includes the following reports:

"Chemical Determination of Aldrin in Crop Materials" by A. E. O'Donnell, M. M. Neal, F. T. Weiss, J. M. Bann, T. J. DeCino, and S. C. Lau; "A Method of Evaluating Emulsifiability of Emulsible Insecticide Concentrates" by B. I. Sparr and C. V. Brown.

"The Role of Surfactants and Solvents in the Formulation of Liquid Pesticides," by L. K. Brunn and R. W. Behrens; "Formulation of Pesticide Dry Concentrates and Dilute Dusts," by J. F. Les Veaux, H. West, C. C. Cassill and F. S. Black; "Equipment for the Commercial Manufacture of Pesticide Formulations," by M. D. Riddle; "Composition Analyses of Technical Grade Materials and Formulated Products Containing Pesticides," by F. A. Gunther and R. C. Blinn; "Pesticide Formulations as Related to Field Performance," by N. F. Hardman and H. O. Thomas; "Fungicide Formulations," by J. D. Wilson; "Problems Related to Toxicity Studies of Pesticides and Formulations" by L. W. Hazelton; "Industrial Hygiene Control in the Manufacture of Pesticides," by W. R. Bradley.

"Some Aspects of the Deposition of Pesticides on Plants," by O. I. Bruce; "Hydraulic Spray Equipment," by F. Irons; "Ground Dusting Equipment," by C. O. Eddy; "Effective Application of Chemicals with Air Sprayers," by J. P. Carr and J. M. Patterson; "Aircraft Sprayers and Dusters," by F. E. Weick; "Equipment Problems and Materials of Construction," by W. H. Zehner.

"Application of Fungicides by Concentrate Sprayers," by J. D. Wilson; "Herbicide Application and Equipment," by L. L. Coulter; "Some Equipment Aspects of the Pre-Emergence Application of Wettable Powder Herbicides," by L. E. Creasy, N. K. Talbert and C. E. Wilson; "Weed Control in Cotton with Chloro IPC," motion picture, E. D. Witman, commentator.

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Gen. Chem. Offers Sta-Fresh

General Chemical Co., New York, announced early in February the commercial distribution of a grade of sodium bisulfite for use by farmers in the treatment of stored silage.

Marketed as "Sta-Fresh", the chemical may be used with most grass forages, also with corn, oats and sorghum. One-half a ton of bisulfite is sufficient to treat 125 tons of silage. General Chemical recommends feeding "Sta-Fresh" into the blower as the chopped silage is blown in the silo. It may also be applied in the field, however this latter use awaits more experimentation. Most of the on-farm testing has been with upright silos, the manufacturer reports. Tests have also been made with silage in pits, trenches, and stacks, and results indicate that treating with bisulfite is superior to other methods.

It is reported that a serviceable applicator can easily be made, using the fertilizer attachment from a corn planter, and powering it with a hand crank or an electric motor.

U.S.D.A. Report Shows Increase in Fertilizer Use

ESTIMATED consumption of fertilizers by regions of the United States and a breakdown of the nutrients contained in these fertilizers are furnished in two tables accompanying the preliminary report on fertilizer consumption for the year ended June 30, 1953.

The report was summarized in the February issue of *Agricultural Chemicals*. The accompanying tables give complete statistical data mentioned in last month's writeup. The final report, providing complete data similar to years past, should be available in May, according to Walter Scholl, who, with Hilda M. Wallace and Esther I. Fox, all of the USDA's Agricultural Research Service, prepared the report.

One interesting highlight of the report is that higher analysis fertilizers have changed the order of highest consuming regions. As a result of this trend, increased use of higher analysis mixes in the East North Central region resulted in a greater consumption of primary plant nutrients than in the South Atlantic region, although the latter area still is the leader in total tonnage of fertilizer materials.

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Mich. Chemical Reports for '53

The 1953 annual report of Michigan Chemical Corp., St. Louis, Mich., showed a net loss of $140,053. "Although the year just closed has been a difficult one for your company," said Theodore Marvin, president, "Michigan Chemical Corporation faces 1954 with considerably improved facilities to reverse the downward trend in sales and profits. Much of the decrease in sales during 1953 was brought about by a limited world-wide demand for insecticides and by the resulting unprecedented low prices." He further commented that the forecast for 1954 is much more encouraging to the insecticide trade than for previous years.

Fertilizer Figures At A Glance

	51-52	52-53
Total Consumption	22,432,418	**23,143,000**
Commercial Mixes	15,086	**15,508,000**
Primary Plant Nutrients	5,203,000	**5,562,000**
Nitrogen	1,422	**1,616,000**
Available P_2O_5	2,199,000	**2,233,000**
K_2O	1,582,000	**1,713,000**

TABLE 1

Preliminary totals of fertilizers consumed, year ended June 30, 1953[1]

Region	Mixtures	All fertilizers[2]	Relative consumption[3] 1951-52 = 100
	1,000 tons	1,000 tons	per cent
New England[4]	390	463	95
Middle Atlantic[5]	1,798	2,102	103
South Atlantic[6]	5,025	6,148	99
East North Central[7]	3,661	5,037	111
West North Central[8]	1,229	2,092	120
East South Central[9]	2,050	3,173	93
West South Central[10]	719	1,399	95
Mountain[11]	64	331	100
Pacific[12]	303	2,022	109
Continental U. S.	**15,239**	**22,767**	**103**
Territorial[13]	269	376	99
Total: 1952-53	15,508	[14]23,143	103
1951-52	15,086	[14]22,432	100
1950-51	13,978	[14]20,991	94

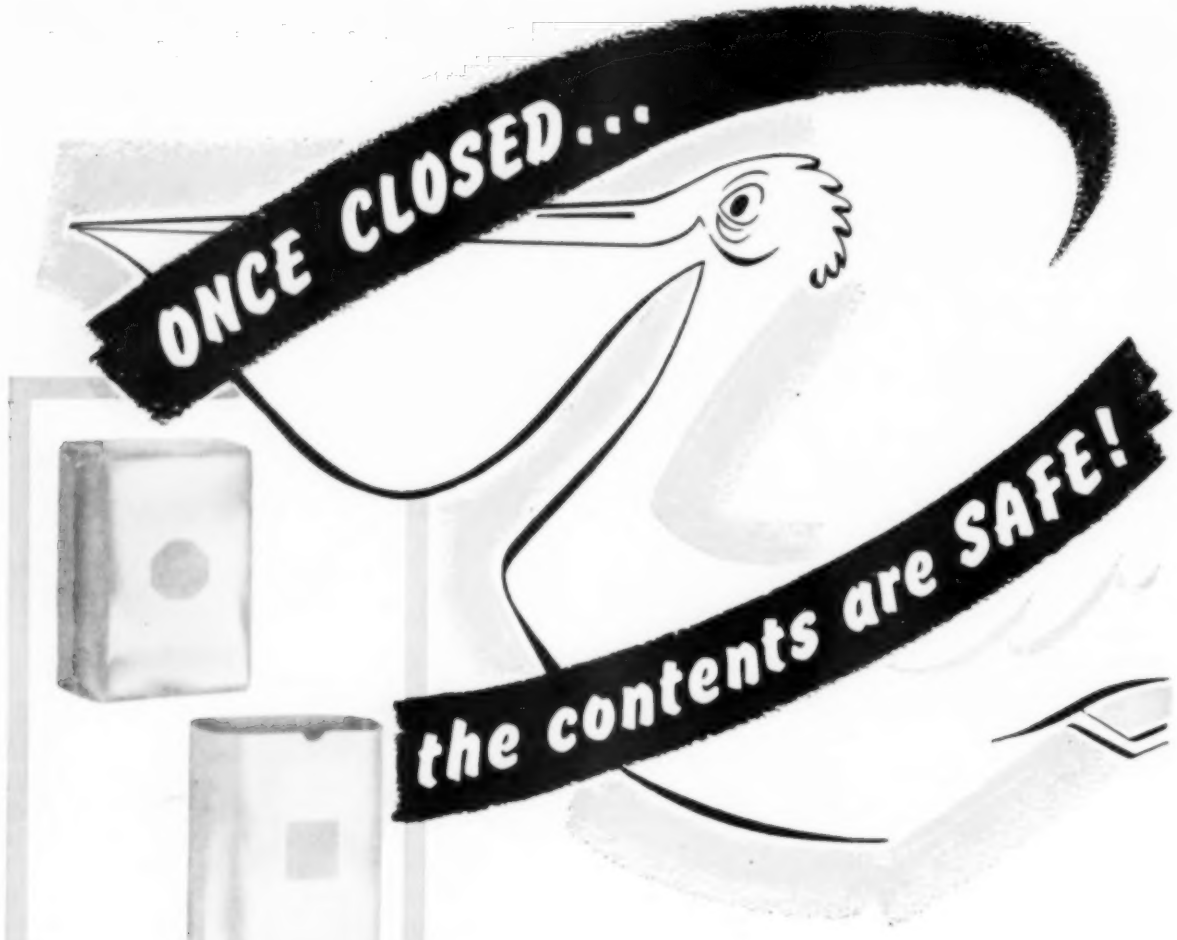
[1]Includes fertilizers distributed by government agencies.
[2]Includes: colloidal phosphate and phosphate rock, basic slag, processed manures, sewage sludge, secondary and minor element materials, such as, borax, sulfur, metallic salts, etc., used as separate materials, and mixtures. Does not include liming materials, but includes gypsum. Excludes materials used in the manufacture of commercial mixtures.
[3]Materials not guaranteed to contain N, P_2O_5, or K_2O are excluded from ratios.
[4]Maine, N. H., Vt., Mass., R. I., Conn.
[5]N. Y., N. J., Pa., Del., D. C., Md., W. Va.
[6]Va., N. C., S. C., Ga., Fla.
[7]Ohio, Ind., Ill., Mich., Wis.
[8]Minn., Iowa, Mo., N. D., S. D., Neb., Kan.
[9]Ky., Tenn., Ala., Miss.
[10]Ark., La., Okla., Tex.
[11]Mont., Idaho, Wyo., Colo., N. Mex., Ariz., Utah, Nev.
[12]Wash., Oregon, Calif.
[13]Hawaii, P. R., Alaska.
[14]Materials not guaranteed to contain N, P_2O_5, or K_2O included in 1952-53 totals 870,000 tons; in 1951-52, 785,050 tons; and in 1950-51, 645,441 tons.

TABLE 2

Preliminary totals of primary plant nutrients contained in all fertilizers and average content of mixtures, year ended June 30, 1953

Region	N	Available P_2O_5[1]	K_2O	Total	Relative consumption 1951-52 = 100	Weighted average content of mixtures
	1,000 tons	1,000 tons	1,000 tons	1,000 tons	per cent	per cent
New England	25	49	52	126	99	28.4
Middle Atlantic	101	250	171	522	105	25.6
South Atlantic	368	489	451	1,308	101	21.6
East North Central	234	530	556	1,320	116	30.1
West North Central	179	304	132	615	129	33.0
East South Central	253	292	199	744	95	23.0
West South Central	151	152	85	388	101	26.0
Mountain	46	53	3	102	100	32.4
Pacific	205	94	28	327	110	26.3
Continental U. S.	**1,562**	**2,213**	**1,677**	**5,452**	**107**	**25.7**
Territorial	54	20	36	110	101	29.2
Total: 1952-53	1,616	2,233	1,713	5,562	107	25.8
1951-52[2]	1,422	2,199	1,582	5,203	100	24.86
1950-51	1,237	2,110	1,380	4,727	91	24.19

[1]Includes 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application, as available P_2O_5.
[2]Revised.



Pack YOUR Agricultural Chemicals in Chase MULTIWALL BAGS

Looking for a bag that's tamper-proof? Spill-proof? You're looking for Chase Multiwall bags . . . the bag you can fill and forget. Available from 2 to 6 plies—Sewn valve, Sewn open mouth, Pasted valve, Pasted open mouth.

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IT COSTS YOU NOTHING, YET IT'S APPARENT IN EVERY CHASE MULTIWALL BAG . . . 107 YEARS EXPERIENCE

Western Cotton Conf. in April

Latest techniques of producing cotton in the arid Western section of the United States will be in the spotlight on April 13-14 at Phoenix, where approximately 400 experts will gather for the third annual Western Cotton Production Conference.

Cotton diseases, insect control, weed control, and defoliation practices will be discussed from the viewpoint of the Western area. Key representatives of the Department of Agriculture, Western land-grant colleges, industrial organizations and the cotton industry will take part in the program.

The two-day meeting will consist of four half-day sessions, each concerned with one of the principal production phases. The conference is sponsored jointly by the Arizona Cotton Growers Association, host to the meeting; Five States Cotton Growers Association; and the National Cotton Council. The Western area usually is defined—relative to cotton production—as Arizona, California, New Mexico, the El Paso area of Texas, and Nevada.

•

Uranium From Phosphates

Texas City Chemicals, Incorporated, is now operating a production unit to recover uranium concentrate as a by-product in its new phosphate products plant at Texas City, Texas. The unit was designed to recover uranium concentrates as a by-product of feed grade dicalcium phosphate and fertilizer grade dicalcium phosphate derived from Florida phosphate rock containing minor quantities of uranium.

The unit is owned and operated by Texas City Chemicals, Incorporated, which has a contract to supply uranium concentrate to the U. S. Atomic Energy Commission.

The Commission has been sponsoring research and process development studies for the recovery of uranium from domestic sources such as the very extensive phosphate deposits and reserves occurring in Florida and several Western states. The first commercial unit for recovery of uranium from phosphate rock has been operated continuously since September 1952, by the Blockson Chemical Company near Joliet, Illinois, where uranium is recovered as a by-product of sodium phosphate chemicals.

Texas City Chemicals, Incorporated, through its efforts to recover uranium from phosphate rock has contributed to the Commission's domestic uranium program. Other processors of phosphate rock are installing in their existing production lines special units to recover by-product uranium concentrate and more installations of this kind are expected to be made in the near future.

Western Cooperative Spray Project

By Charles Starker

ABOUT one hundred Entomologists and Plant Pathologists from seven states and provinces met in Portland, Oregon at the Imperial Hotel January 20, 21, 22 for their 28th Annual Meeting.

Dr. I. C. Glover, guest speaker of products development, Shell Chemical Company, San Francisco, spoke on "The Changing Picture in the Development of Chemicals for use as Agricultural Pesticides." He touched very briefly on the effect of organic pesticides on agricultural operations, their action on beneficial insects, and the increase in quality, quantity and variety of crops by the wise use of pesticides. Dr. Glover mentioned a good rule of thumb for development of a new pesticide is "three years and a million dollars." He stated, "Industry needs the help of Government and State personnel in meeting and solving its problems." High cost of pesticide development, restrictive legislation, toxicity scares and liability are four of the most important of these problems. Add to these high wages, material costs, taxes, real estate values, technical services, years of development and the analytical and toxicological work necessary to meet restrictive legislation, and you begin to see the problem facing industry. This is further affected by the danger that a toxic material will be outlawed by scare publicity, and from the manufacturers' liability arising from misuse of chemicals—over which the manufacturer has no control.

Cherry Insects

S. C. Jones, OSC entomologist, reported on cherry research work. The cherry fruit fly control program in Washington in 1953 was most successful. Experimental trials there showed Systox, EPN, Parathion, Dilan and Diazanon to be effective against the fly. Preliminary work on use of insecticides in the soil against the overwintering fruit fly larvae and pupae was reported, with several of the materials used showing excellent promise.

The black cherry aphis on cherries was reported as being easy to control with any of the phosphate materials, but the green peach aphis was more difficult to control. Systox painted on trunks of three year old cherry and prune trees gave control of the black cherry and mealy plum aphids. One application cleaned up the infestation, and kept the aphis off for the entire season.

Apple Fungicides

Karathane was the only new material suggested for mildew control. It will be available this season only in limited quantities. It has been suggested for use in young orchards to knock out mildew there.

Apple and Pear Pests

"There is a great deal of difference in the behavior of both pests and pesticides used for their control—in the various fruit-growing areas of the Northwest" Dr. L. G. Gentner told the group. "We still have a great many things about them yet to learn."

Phosphate-resistant red mites are now wide-spread, and occur in most areas in the west, with the exception of southern California. DDT is still effective for control of codling moth in the Northwest, but there is one report of suspected resistance in the Yakima area.

The pear psylla in two short years has spread from Hood River on the northern boundary of Oregon, down to the Rouge River section of southern Oregon and across the line into three northern California counties. Parathion, malathion, EPN and Diazanon applied as growing season sprays have given good control in most cases.

Dr. H. S. Telford, WSC Entomologist, reported on the use of surface-active agents in British Columbia to aid in securing a more uniform deposit of spray on trees with speed sprayers. By judicious use of these materials, they were able to increase the deposit on the upper parts of the trees.

Field studies of a "dustless" type of parathion wettable spray powder showed the formulation was successful in greatly reducing the concentration of parathion in the air.

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With a "NEW LEADER" MOTOR DRIVEN SPREADER

and WE WANT TO PROVE IT!

► A good spreading service — owned by the company, a dealer, or an individual — is the modern, easy way to sell fertilizer. Good spreading makes good fertilizer look better, while spotty and inaccurate spreading ends in spotty crop growth and an unhappy customer. If an excellent job of spreading is done, you'll sell more fertilizer. It will pay you, as it has paid so many other fertilizer companies, to actually prove to the farmer that your product will go further and do a better job if the best spreading equipment is used. Many companies demonstrate right in the field — showing a perfect pattern of just the right amount per acre — then and only then, in many cases, is the farmer sold.

► The "NEW LEADER" Commercial Fertilizer Spreader is a complete spreading service in one unit. Every inch of every acre is spread evenly and uniformly. Never too much, never too little, regardless of speed, field conditions, or changes in gear. Retaining its ability to spread in the larger quantities, this unit can spread as little as 100 pounds to the acre with complete accuracy.

► Bulk buying and handling, plus a "NEW LEADER", makes it possible for dealers to give farmers custom fertilizer spreading service at the cost of the bagged product alone.

► Available in job-tailored capacities of 4¾ to 8 cubic yards.

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This 20-ton Self-Unloading Bulk Transport covers more territory and handles more material with fewer trips and at lower cost. The "NEW LEADER" Bulk Transport unloads either at ground level or, when equipped with optional 14-foot hydraulically-operated elevator, above the ground either into bins or spreader trucks. Available in 5 to 25 ton capacity and in lengths from 11 feet to 40 feet.

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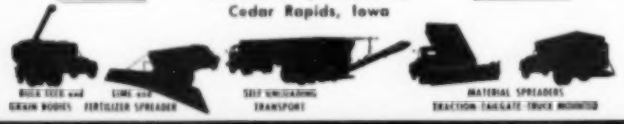

BULK FEED and GRAIN BODIES — LIME and FERTILIZER SPREADER — SELF UNLOADING TRANSPORT — MATERIAL SPREADERS TRACTION TAILGATE TRUCK MOUNTED

Prove It To Yourself! See the "NEW LEADER" way to Greater Savings in Action — Write your distributor for a demonstration — or write the factory.

Two New Atlas Plants

Atlas Powder Company of Wilmington, Del., announced last month it had started construction of two esterfication plants, one at Memphis, Tenn., and the other at Brantford, Ont. The plants will expand the company's already substantial production of emulsifiers and other surface active agents for the insecticide industry.

This move will (1) mark the company's emergence as a multi-plant producer of fatty esters of sorbitol and glycerine; (2) extend its already large interest in the utilization of farm products for the production of chemicals; (3) enable Atlas to take advantage of the surplus supplies of fats and oils as chemical raw materials as it now does with sugars in the production of sorbitol; (4) offer lower freight costs to users of emulsifiers in the South and in Canada.

The plant at Memphis, larger of the two, will cost more than $1,000,000 and is scheduled for completion by late 1954.

The second plant, at Brantford, Ont., is being erected by Atlas Powder Company, Canada, Ltd. Its first unit, to cost about $350,000, will be in operation within six months. Preliminary planning has been started looking to the addition of a second unit for the production of ethylene oxide derivatives at this location.

Construction of the two new plants will enable Atlas to produce emulsifiers at three widely separate locations, affording increased dependability and flexibility in source of supply. The Memphis plant, situated as it is adjacent to the plant of HumKo Company, processors of fats and oils, will be able to take advantage of a close raw material source and the latest technological improvements. The plant at Brantford will utilize raw materials which will be purchased largely from Canadian agriculture, supplemented only when necessary by the importation of certain specialties from world markets or from the United States. Both plants will provide faster service and savings in freight costs to the industrial markets in their areas.

Dow Expands In NY, Canada

The Dow Chemical Co., Midland, Mich., opened new New York offices early in February, providing about 50 per cent more space for sales of agricultural and general chemicals.

Dow also plans to expand its ammonia making facilities in Canada, which will provide in excess of 100 tons per day. Cost of the project, to get under way early in March, will be more than three million dollars.

•

New NFA Services

The featured column "*SLANTS on the NEWS*," appearing in the biweekly edition of *Fertilizer News* has been expanded to a weekly feature, and will serve as a regular news service to members of the National Fertilizer Association. The regular facts-and-figures section of *Fertilizer News* will continue to be issued every two weeks.

State Leaflets Prepared

The NFA has also begun a series of leaflets for use as mailing pieces, wall posters, or handouts for specific states. The leaflets show graphically the potential benefits from use of recommended amounts of fertilizer; they also illustrate a comparison of cost of fertilizer and crop yield.

The first such leaflet was designed for use in South Carolina. Second and third leaflets were for Georgia and Kentucky.

Cost of the leaflets to NFA members is $3.00 per hundred. The Association reports that similar leaflets will be prepared for other states, where members indicate that they can be used.

•

V-C Names Willis to Fla. Plant

William A. Willis has been named superintendent of Virginia-Carolina Chemical Corporation's new triple superphosphate production unit near Nichols, Fla., it was announced in mid-February by Charles E. Heinrichs, who is vice president of the company.

Willis has been with V-C since 1937. He served with the purchasing, chemical control and mining departments in Richmond until his transfer to Memphis, Tenn., in 1948 as factory superintendent there. He went to Florida in the summer of 1952 when construction of the new plant got underway. Willis holds a B.S. degree in chemical engineering from the University of Illinois.

Also named to posts at the new unit were William C. Thomas and Joseph W. Venable, assistant superintendents. James Edgar Hatch, was appointed assistant superintendent in charge of the sulphuric acid plant; and M. J. Houston, was appointed engineer.

Mathieson Deodorizing System

Mathieson Chemical Corp., Baltimore, announced early in February that construction had begun on a combination fume scrubber and burner installation at its Pasadena fertilizer plant.

The new system, which will replace the use of masking agents, will cost approximately $200,000 and is expected to be completed sometime in April. The installation is expected to eliminate fertilizer odors arising from Mathieson's operations.

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Basic Copper Sulphate
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Agricultural Chemical Specialists

News Brevities

MORE THAN 300 members of the agricultural chemicals industry, including manufacturers, distributors and dealers participated in a two-day Agricultural Chemical Conference recently in Lubbock, Tex. It was sponsored by the Lubbock Chamber of Commerce, in cooperation with Texas A&M, West Texas Chamber of Commerce and Texas Technological College.

•

KENNETH M. HOLADAY Jr. has joined Pittsburgh Coke & Chemical Co. as a sales representative in the Agricultural Chemicals division. Holaday formerly served with Monsanto Chemical Corp. His appointment was announced by W. Scott James, sales manager of the division.

•

DUPONT HAS TRANSFERRED Dr. Darrel C. Drake, of the company's agricultural product development section in San Antonio, Tex., to Memphis, Tenn., where he will do field development work in the mid-South with herbicides, fungicides and insecticides.

•

WALLACE F. ARMSTRONG has been promoted from manager of Ethyl Corp.'s Houston plant to assistant general manager of manufacturing, a new position.

•

CHEMICAL CONSTRUCTION CORP. was one of several firms which received awards for outstanding safety records in 1953. The awards, made by the National Constructors Association, are part of a year-round "safety engineering" program.

•

W. AUSTIN BISHOP has succeeded Cleveland Lane as manager of public relations for Pennsylvania Salt Manufacturing Co. Lane went to the Manufacturing Chemists Association as assistant to the president, as reported in February *Agricultural Chemicals*.

•

NEW ASSISTANT DIRECTOR of the TVA division of Agricultural Relations is Dr. Martin E. Weeks. His appointment was announced by Dr. Leland G. Allbaugh, director of the division. Weeks joined the fertilizer distribution brand, TVA in 1952.

•

MORE ANHYDROUS ammonia and urea for the Southwest will be made available when an $18 million petrochemical plant at Timpson, Tex., is completed late in 1955. United Chemical Co. of Dallas headed by Grover Hartt, is building the plant.

•

THE DEVELOPER of Cyanogas for American Cyanamid died Feb. 16 after a long illness. Dr. Stanley W. Bromley, of Stamford, Conn. joined Cyanamid in 1923, later becoming chief entomologist for the Bartlett Tree Research Co. of Stamford. He retired three years ago.

•

EXPANDED STUDIES of insects and effective methods of controlling them will be possible with construction of a $25,000 insecticide compounding

SUPER SPOT SERVICE

to the Mid-South and Southwest has always been our policy.

★ From Seven plants we can deliver within 10 hours to any point in the Southwest or Mid-South.

★ We have a large staff of experienced entomologists and chemists.

★ De-Pester Farms, Inc. (Eight hundred acres of Delta land for developing, testing and evaluating insecticides, herbicides, and other agricultural chemicals and application procedures).

DE-PESTER

BRAND PRODUCTS

BHC	**Aldrin**	**Chlordane**	**2,4-D**
DDT	**Dieldrin**	**Sulphur**	**Defoliants**
Toxaphene	**Parathion**	**Rhothane**	**Systox**

CONCENTRATES (Liquids and Dust Bases)

FORMULATIONS (Finished Dusts and Sprays)

CUSTOM BLENDING AND PROCESSING

Agricultural Chemicals, Inc.

General Office and Main Plant

LLANO, TEXAS

Seven processing and mixing plants in Texas, Louisiana, Mississippi, Arkansas and Peru, S.A.

building at the Citrus Experiment Station in Los Angeles. The building will be erected on the Riverside Campus of the University of California, according to an announcement from A. M. Boyce, director.

•

NEW YORK DISTRICT sales manager for Pennsylvania Industrial Chemical Corp. is L. R. O'Rourke, who previously had been a sales representative for the company.

•

HOWARD G. CONLEY, vice president of Pacific Guano Co., now is manager of the Southern division with headquarters in Los Angeles. He replaces George P. Bloxham, former manager.

•

TWO CHANGES in the multiwall bag sales division have been announced by Union Bag and Paper Corp. J. E. Fitzsimmons, sales representative, has been transferred from Chicago to Detroit, while D. W. Rauch, formerly of the Chicago office, now is sales representative in Wisconsin and Illinois.

•

APPLICATION FOR A zoning variance to build a fertilizer plant a mile north of the University of California, at Riverside, Cal. was dropped last month by Karl Ahlswede after several groups had expressed opposition to industrial development in the area.

•

COYNE CHEMICAL CO. formerly of 685 Antonia St., Los Angeles, Cal. has moved to a new office and plant at 4476 E. Washington Blvd., Los Angeles, 23.

•

R. F. WELTER has joined the New York direct sales group of Antara Chemicals, sales division of General Aniline & Film Corp., it was announced late in February by S. H. Williams, vice president and general sales manager.

•

MATHIESON CHEMICAL CORP., of Baltimore, has announced plans to build a $50,000 storage tank and distribution station for anhydrous ammonia in Ridgely, Md. It will serve dealers throughout the central portion of the Eastern Shore area.

FULL-TIME STATE insect survey supervisors are expected to improve the effectiveness of the USDA insect pest reporting service for the nation's farmers. The supervisors are sponsored jointly by USDA and agricultural agencies in the states. They already are at work in seven states.

•

CONSUMERS COOPERATIVES ASSOCIATION of Kansas City, Mo. has made the taking of soil samples by co-op members an easy matter with specially designed soil sample bags. The bags are supplied free to local co-ops.

•

W. J. FRANCIS, Western general sales manager for American Potash & Chemical Corp predicted last month that use of agricultural chemicals in farm production will undergo a "substantial rise" in 1954, despite acreage curtailment throughout the United States.

SPECIALIZING IN

SERVICE and SUPPLY

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The presence of only a small percentage of this diatomite powder—because of its great bulk per unit weight, and the irregular shape of the individual particles—fluffs up the final dust. This helps neutralize the effect of heavy extenders—insuring better dispersion of the poison.

Celite is also an excellent absorption medium for liquid poisons. Its exceptionally high absorption capacity permits a much higher percentage of liquid poison to be absorbed while still maintaining a dry dust concentrate. This results in a more potent effect in the final product . . . as well as in lower packaging and shipping costs.

Why not investigate the use of Celite as a means of improving your product and making your operation more profitable? For further details, write Johns-Manville, Box 60, N. Y. 16, N. Y.

Properties of CELITE

FINENESS: Approximately 100% through 325 mesh
DENSITY (Vibrated): 11 pounds per cubic foot
BULK: Celite bulks much higher than most diluents
ABSORPTION: 200% of its weight of water
500% of its weight of kerosene
pH VALUE: Below 7.0
INERTNESS: Compatible with insecticide and fungicide poisons
SUSPENSION: Excellent in both air and water
COMPOSITION: Celite is amorphous diatomaceous silica (SiO_2)

Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

Johns-Manville CELITE

DILUENTS AND GRINDING AIDS

Technical
SECTION

SPRAY DRIFT DAMAGE*

ONE of the most troublesome problems in weed control is the drift of 2,4-D herbicides from the field being treated onto neighboring crops which may be seriously damaged. Before the advent of 2,4-D and similar growth-regulating herbicides, damage from drift seldom extended more than a few feet away from the treated area and responsibility could readily be fixed on the person causing the trouble. When the growth-regulating substances came into use, peculiar effects on sensitive crops occurred miles away from the site of application and it became impossible to point the finger at the particular application that caused the effects or damage.

There are two significant factors in this problem—the increased use of aircraft for application of herbicides, which increases the hazard of drift beyond the area being treated, and the development of more potent herbicides than were previously available. Last year 336,000 acres of rice, other grains, and pasture were treated in California by aircraft with 2,4-D or 2,4,5-T; and 2,4-D is so potent that, in theory at least, one teaspoonful could destroy an acre of cotton if it drifted onto this susceptible crop.

The problem was investigated by the State Legislature of California as a result of complaints from growers of susceptible crops, and in 1949 laws were passed providing for the regulation of the use of injurious herbicides. These laws placed on the Department of Agriculture responsibility for setting up regulations, after investigation and hearing, to guide the use of injurious herbicides so that proper weed control could be carried on with the least likelihood of damage to crops of value. When hearings were held on proposed regulations it became quite clear that the rice and grain farmers were sure that they must use injurious herbicides in order to continue to raise profitable crops while, on the other hand, the growers of susceptible crops, such as grapes and cotton, were equally certain that their crops would be wiped out unless the use of 2,4-D was prohibited. The agricultural pest control operators, who apply herbicides for hire, were inclined to blame the manufacturer for producing a hazardous product, and the manufacturers charged that the main cause of the problem was faulty application. Injured parties maintained they were not able to prove which of several applications was definitely responsible for the particular damage and that all questionable use should be prohibited. Compromises were reached at the hearings to resolve these conflicts and regulations were set up providing detailed precautions designed to prohibit certain uses that seemed to be likely to cause damage while otherwise permitting use of this valuable agricultural chemical. As in the case of all compromises, none of the parties was thoroughly satisfied with the regulations but they were the most reasonable that could be worked out on the basis of the knowledge available.

Portions of California, in which susceptible crops are grown, have been described as hazardous areas. Special regulations restrict use of 2,4-D in these areas and four years' experience has shown that damage in those areas has been satisfactorily avoided. At the present time several groups of rice growers in the hazardous areas have filed petitions with the Director of Agriculture requesting that their properties be excluded from the hazardous area so that they may apply 2,4-D with fewer restrictions. One hearing was held on January 12, 1954, and this has been continued until February 16, to permit the various parties to get together and to bring in any resonable changes in the regulations that they can agree upon.

* Summary of remarks by A. B. Lemmon, Calif. State Department of Agriculture at Sixth Annual California Weed Conference, January 27-28, 1954 in Sacramento, Calif.

•

Denitrification of Soil Studies

Nitrogen reduction in soils high in mineral nitrogen or heavily fertilized with nitrogen, is partly due to leaching, volatilization and transformation to nitrogen gas. However, various workers have established that denitrification in soil is brought about by certain organisms when organic materials are present as energy sources, and that denitrification is favored by anaerbic conditions, ie, absence of molecular oxygen . . . such as occurs in rather moist soils.

Several investigators have noted a disappearance of nitrates in the soil after sulfur has been applied. This reduction could result from the denitrification process, from the utilization of the nitrate for cell synthesis by the bacteria oxidizing the sulfur or both. Studies were made to determine the effect of type of nitrogen fertilizer applied, and moisture content of the soil on the disappearance of nitrates, and actual loss of nitrogen from soil treated with elemental sulfur.

The studies indicated that at low moisture levels inorganic nitrogen is reduced or may be completely depleted by utilization of the nitrogen for cell synthesis by the organisms which oxidize the sulfur to sulfuric

acid. The nitrogen in the nitrate molecules, which is used as a source of oxygen is lost to the air in the form of nitrogen gas.

When sulfur is applied to soils, plants may temporarily suffer from lack of nitrogen if the amount of available or inorganic nitrogen is not sufficient to meet both the requirements of the organisms which oxidize the sulfur and the plants which are growing on the land. J. P. Martin and J. O. Ervin *California Agriculture* p.11, 8, No.4, (1954)

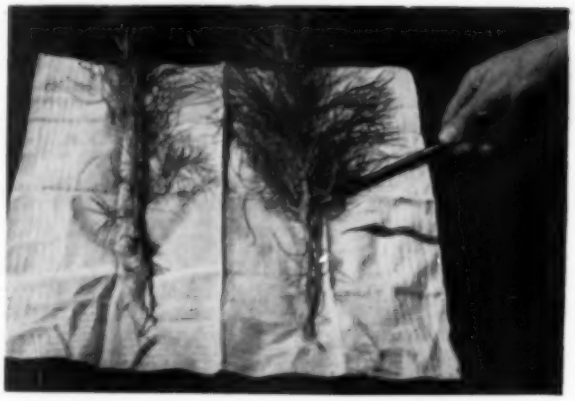
•

Control of Suckers on Tobacco

It is practical to use certain chemicals on flue-cured tobacco to prevent excess growth of suckers. The most promising material tested thus far in Georgia in maleic hydrazide (MH-30). This has been used experimentally several years with consistent success in controlling suckers and without causing soft rots, leaf drop and similar injury. It is possible, however, to injure tobacco by improper application of MH-30, and for this reason a definite procedure is suggested for using the material. It is applied as a spray and usually only one application is necessary. Thus the length of time required for the major suckering job is governed by how long it takes to spray the tobacco one time. Experimental attempts to control suckers with mineral oils in Georgia have not been consistently successful.

No adverse influence on leaf grade and yield has been observed from the use of MH-30. Sometimes a slight increase in yield is associated with the treatment. It has slightly affected the chemical composition of the two top primings, but has not materially influenced earlier curings. The two top primings usually show a slight increase in sugar content, and this is considered an advantage. These two primings also usually show a slight thickening, or increase in "body," of the leaf and this is considered a disadvantage by domestic cigarette manufacturers. These differences, although consistent, have not been very important. Mimeograph Paper #84 *Georgia Coastal Plain Exp. Sta.*, Tifton, Ga.

Fungicides For Southern Pine



Fusiform rust first shows up on pine seedlings as a small swelling or canker at the base of the stem, (pointed out by pencil at right). Infection occurred shortly after germination. A healthy seedling is on the left. Often the swelling is not as large as the one shown here. Seed was sown in April and the seedlings lifted in October.

EXPERIMENTS by the U. S. Forest Service led to the recommendation of "Fermate" ferbam fungicide for control of fusiform rust and also of brown spot in nurseries. This compound has been in use as an agricultural fungicide for more than a decade, and is well known throughout the South as a specific control for blue mold in tobacco plant beds and elsewhere as an apple fungicide.

Fusiform rust may infect a seedbed very early in the season, even before the mulch is removed. Spores develop on oak leaves, and become most abundant when there is an 18-hour period, or more, of 60 to 80 degree temperatures with humidity close to the dew point. So experienced nurserymen begin spraying about as soon as the seedlings break through the ground, covering the beds at least three times a week and after every rain. Sometimes a conscientious spray program means as much as 11 applications a week. One man may be assigned exclusively to spraying during the critical months. Spraying three beds at a time, a tractor sprayer can cover 14 acres a day. Spraying usually ends by mid-June.

Experimental evidence indicates that chemical sprays are the only sure method of controlling fusiform rust. Late sowing may reduce seedbed infection substantially if May weather is hot and dry, but this control method is not too reliable, and it may lower the quality of the stock. As for culling, even the most careful workmen cannot pick out all the cankered seedlings, and at best culling without preventive measures wastes land, seed, fertilizer, and labor unnecessarily.

Two pounds of "Fermate" fungicide in 100 gallons of water is enough for one spraying on an acre of seed-bed. Addition of a combined sticking and wetting agent helps make the spray more effective.

Preparation of the seed-bed is particularly important, to achieve a fertile, fine-conditioned soil, high in organic content. Up to 10 tons of sawdust per acre, and a heavy application of nitrogen fertilizer (to speed rooting), may be plowed under in the spring, and then the seed-bed area is sown to a cover crop. This cover crop is turned under in the fall or winter, and more fertilizer is added prior to sowing for a tree seedling crop. Hence a seed-bed is used only every other year.

Foliage sprays of a urea fertilizer compound are also used frequently during the summer to supply additional nitrogen for quick absorption to correct chlorosis. It has been found that nitrogen from urea can be absorbed through the needles of pine seedlings.

These seedlings are the basis for rapid expansion in southern forest wealth as idle lands are put to work. Some 400,000 to 500,000 acres of denuded forest lands are being replanted this year in the South. In 15 to 20 years, thinnings can be made for posts and pulpwood. In time to come these plantations will produce poles, piling and sawlogs.

improved RIVERDALE brush killer

added... SOMETHING NEW!

We could call this something new "SUPER DOOPER X" but with any coined name it all boils down to just one important fact for you — BETTER WETTING and SPREADING PROPERTIES —

- **BETTER KILL!**
- **FASTER ACTING!**
- **IMPROVED PENETRATION!**

There is a RIVERDALE BRUSH KILLER for every need. The next time you order refer to this list.

- **RIVERDALE BRUSH KILLER 2 - contains 2 pounds 2, 4, 5-T acid and 2 pounds 2, 4-D acid per Gallon.**
- **RIVERDALE BRUSH KILLER 2 Low Volatile - Same as above except a LOW VOLATILE formulation.**
- **RIVERDALE 2, 4, 5,-T ester LOW VOLATILE-contains 4 pounds 2, 4, 5-T Acid per gallon in a low volatile formulation.**
- **RIVERDALE 2, 4, 5-T - contains 3⅓ pounds 2, 4, 5-T Acid per gallon.**

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CHEMICAL COMPANY
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P.S. The superior emulsifying properties of RIVERDALE BRUSH KILLERS makes it possible to dilute with water, oil or water and oil.

Aphids Carry Tristeza Disease

Two aphid species have been listed as carriers of the tristeza virus disease of Florida citrus trees, in preliminary tests by U. S. Department of Agriculture entomologists and cooperating plant pathologists. The green citrus aphid and the melon aphid both have been proven carriers of the disease as the result of less than two years experimentation by the Department's Agricultural Research Service at Orlando, Fla.

•

Sugar Bait for Fly Control

Mixtures of sugar and organic phosphate insecticides that can be shaken like salt onto the floors of livestock buildings are showing great promise as a method of controlling flies resistant to such chlorinated hydrocarbon insecticides as DDT, report U. S. Department of Agriculture entomologists.

Three phosphate insecticides—malathion, diazinon, and a dialkyl phosphate material — were tested at the Orlando, Fla., laboratory of USDA's Agricultural Research Service during 1953, and all of them proved effective in controlling DDT-resistant flies. Used in dairy barns and poultry houses, the three chemicals reduced resistant fly populations by 90 per cent or more within four hours after application.

The three phosphates appear to be well suited for farm use against resistant flies because they are not only the best fly-killers of several chemicals tested, but have relatively low toxicity to livestock and humans.

In practical tests in dairy barns in the Orlando area, the Department entomologists got excellent control of flies by applying the dry sugar bait at the rate of 100 grams (about 3.5 ounces) in each building. They found it necessary to treat five times a week for 2 or 3 weeks to reduce fly populations to a low level in locations where the pests could breed readily. The daily treatments were accomplished in a few minutes with a pint jar fitted with a perforated lid and filled with the sugar-insecticide mixture. Enough insecticide for the entire fly season would cost less than a single residual insecticide spray treatment of a typical dairy unit.

In most cases, the dry sugar baits proved more effective than the liquid insecticide baits that were announced by USDA entomologists about a year ago.

•

Fortified Fertilizer

A concentrated fertilizer containing 97 per cent plant nutrients was described by J. C. Driskell, F. A. Lensfest and Dr. Grady Tarbutton, TVA chemists, at the recent regional conclave of the American Chemical Society in New Orleans. It was reported that the new fertilizer is made by burning phosphorus in air and combining the resultant phosphoric oxide with ammonia gas. The fertilizer is designed to give improved crop response and to be effective over longer periods than commercial products now in general use.

It comes as a white powder, containing about 17 per cent nitrogen and 80 per cent of a phosphorus compound. According to the report, small scale greenhouse tests indicate that the new fertilizer has a slight superiority over the nitrate-superphosphate mixture in residual effect. It is emphasized that the new product is still in the laboratory stage.

•

Insecticide Effects on Soils

The toxic effect on plants of certain common organic insecticides is reported to persist in some soils for as long as eight years after application, according to A. C. Foster, Agricultural Research Service in the U. S. Dept. of Agriculture. Tests show the persistence of different insecticides to vary considerably, as does the sensitivity and tolerance of different plants. Tests in greenhouses have shown DDT and the related compounds rhothane and methoxychlor to be among the most persistent compounds, followed by dieldrin and toxaphene. Chlordane, aldrin, BHC and lindane were less persistent. Other compounds included in the tests were endrin, isodrin, CS-708 and heptachlor. Report by A. C. Foster at 1953 meeting of the American Asso. for Advancement of Science.

Chemical Brush Control

Except for mesquite, the major chemicals used in brush control today are 2,4-D and 2,4,5-T, separately or in brush-killer (BK) combinations, and ammonium sulfamate. Although less selective, ammonium sulfamate is effective on some types of brush which resist 2,4-D and 2,4,5,-T. Its use is limited to ground applications, because of the large volume of water required. With the phenoxy compounds, relatively small amounts of chemicals are needed, and low-volume plane application is practical with certain plants.

The desert or creeping type of mesquite of far western ranges is somewhat difficult to control. Sodium arsenite, or diesel oil are still widely recommended by Arizona range specialists as the most reliable chemical treatment. These nonselective agents, of course, kill grass as well as brush, and livestock must be protected against poisoning from sodium arsenite. *Farm Management* 2, No. 13, 35-43 (1953).

•

EDB Control Nematodes

A number of crops grown on the organic soils of Michigan are attacked by plant parasitic nematodes which in many instances are limiting production. The more susceptible crops appear to be carrots, celery, and onions. Those found present in the largest number are root knot, root lesion, pin, and the stubby root nematode.

Soil fumigation experiments with carrots and parsnips have shown that nematodes can successfully be controlled with about 6 gallons per acre of actual ethylene dibromide (EDB). Fall treatment appears better than spring treatment because of more favorable soil moisture and temperature conditions. Good results have been obtained on the control of nematodes on celery and onions, but ethylene dibromide has, at times, been injurious to onions. Where nematodes were not a problem, fall fumigation had little effect on the yield of sugar beets, carrots, and celery. *Down to Earth* (house organ, Dow Chemical Co.) 9, No. 3, p. 6-9 (1953).

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High Grade Muriate of Potash!
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WISCONSIN Insect Control Conference

A MESSAGE of welcome by Rudolph K. Froker, Dean and Director of the College of Agriculture launched the proceedings of the eighth annual Wisconsin Insect Control Conference with Industry at Madison on January 13 and 14. The attendance of almost 200 representatives discussed insecticide and fungicide tests on various crops in Wisconsin.

As early as 1949 the North-Central Regional Technical Committee on Entomology considered ways and means of getting underway a regional research project entitled "The Cause of Insect Outbreaks." T. C. Allen was appointed to a sub committee to accumulate material on the potato leaf hopper, *Empoasca fabae* (Harris). Other personnel on the sub committee were Ray Hutson, Michigan State, and J. A. Munro. Reports from the various co-operating areas were forwarded to a compilation center at the Department of Entomology, University of Wisconsin. All specimens of leaf hoppers forwarded by the collectors to the University of Wisconsin were checked for identification by J. T. Medler.

In connection with insect surveys T. C. Allen stressed that the significance of insect outbreaks due to insect migration has received inadequate attention by entomologists. With co-operative effort by some 10 to 12 North Central Regional States, it has been possible to follow the migration pattern of the potato leaf hopper. It is hoped that studies of the insect habits will show the reasons for insect build ups.

J. T. Medler reported that the survey was hindered in 1951 by the very early season. However, in 1952 and 1953 an extensive co-operative survey was accomplished, which has definitely established that the potato leaf hopper shows a wave-like spread in the date of first occurrence. There appears to be a concentric pattern northward from the Gulf areas.

Discussing migration and infestation by the six-spotted leaf hopper in Wisconsin, Dr. R. K. Chapman indicated that the early infection observed in carrots, lettuce, and potatoes was largely, if not entirely, a result of viruliferous insects among the migrants. It is of considerable practical importance to know that initial inoculum is brought in by the migrants. It is also of note to know when this early migration occurs, its size and extent, and the relative number of infective individuals among the leafhoppers.

E. H. Fisher listed four criteria for determining the approximate time and need for treatment against first generation corn borers. First, use of the borer degree-day accumulation; second, recent leaf-feeding counts in individual plantings; third, use the table based on leaf-feeding index of active borer populations and plant maturity as measured in height of growth listed in Wisconsin Recommendations); and fourth, treatment may not be of value when frass accumulations indicate borers have reached advanced instars. Fisher indicated that fall surveys are only of value in estimating damage and are not reliable for predictions on severity for the following year.

Insect survey problems were outlined by Kelvin Dorward, Chief of the Economic Insect Survey Section, U.S.D.A. Dorward reiterated the need for co-operative efforts in insect surveys. He said that co-operative survey programs have been initiated in other States. He expressed the hope that a co-operative program between Federal and State authorities could be initiated in Wisconsin.

E. L. Chambers, State Entomologist, discussed State regulatory action in relation to neglected orchards, pickleworm infestations, potato tuber rot nematode and labeling of insecticides and fungicides.

R. K. Chapman reported on various methods of application of insecticides for onion maggot control. He indicated that seed and furrow treatments were slightly better than soil applications and considerably better than surface sprays and dusts in 1953. Heptachlor, dieldrin, and aldrin, in that order, gave good protection in seed, granular-furrow and soil treatments. Parathion gave good results as a seed treatment (in spite of delayed germination of several days) but was unsatisfactory as a soil treatment. Chlordane was not satisfactory as seed treatment but gave reasonably good control in the soil and as a furrow treatment with a granular formulation.

Results of tests for the control of wireworms on corn, oats and lima beans were presented by E. M. Raffensperger. Granular insecticides mixed with starter fertilizer proved of great value in the control of *Limonius* wireworms on lima beans planted in a sandy-loam soil. Aldrin,

Left: Mark Mercer, Spraying Systems Co.; James Hopkins, Hopkins Agricultural Chemical Co.; Al Weed, John Powell Co., and C. DuCharme, Aerial Blight Control. Right photo: D. McDowell, Wisconsin State Department of Agriculture; J. Iverson, Economic Insect Pest Survey Service; and K. Dorward, U.S.D.A.

Left photo: R. E. Shenefelt, Univ of Wisconsin; T. C. Allen, Univ. of Wisconsin; and R. K. Froker, Agricultural Experiment Station. Right Photo: Program Committee Members, all of the University of Wisconsin: J. W. Apple, D. A. Dever, and E. H. Fisher.

chlordane, heptachlor, and gamma-BHC provided protection. Seed treatments of lindane, aldrin, dieldrin, heptachlor, chlordane, EPN, parathion, endrin, and isodrin also provided protection. Seed treatments of lindane and dieldrin protected corn against *Limonius* wireworm attack. In heavily infested areas, yields of treated plants were more than 46% greater than yields of untreated plants. Lindane, aldrin, dieldrin and heptachlor treatments to oats seed planted in land infested by *Agriotes* and *Cryptohypnus* wireworms gave good protection as compared to untreated seed.

Paul E. Hoppe, plant pathologist, U.S.D.A., reviewed the production of hybrid seed corn, and seed treatment in Wisconsin.

W. V. Miller and R. K. Chapman discussed the control of the seed corn maggot on lima beans. They indicated that seed treatment affords the best type of protection. In case of heavy infestations, rates of application, even several times as heavy as those recommended, would not give complete control. It is a question of balancing insect control against the injury caused to the seed by increased application rates.

J. W. Apple reviewed the results obtained on the effect of lindane and dieldrin seed treatments on corn. An excessive dosage of 4 ounces of lindane per bushel of seed caused corn seedling roots to be shortened 85 per cent in laboratory tests with sweet and dent corn while in field plots stands were reduced about 35 per cent. No such injury was detected from the use of 4 ounces of dieldrin per bushel. Lindane dosages around 1 ounce per bushel were found to be relatively safe on 12 sweet and 7 dent varieties. There was no increase in phytotoxicity from the two insecticides when treated seed was stored for a period of 18 months.

Earl K. Wade, Department of Plant Pathology, discussed fungicides for seed treatment as foliage sprays and dusts. He indicated that timeliness and coverage are of prime importance; and that spray trials are showing that low-pressure low-gallonage (80 to 150 pounds at 40 to 60 gallons per acre) spraying is effective for disease prevention on vegetable crops. Both organic (nabam, zineb, manganese ethylene bisdithiocarbamate) and inorganic (fixed copper materials, etc.) fungicides can be used in vegetable disease control work.

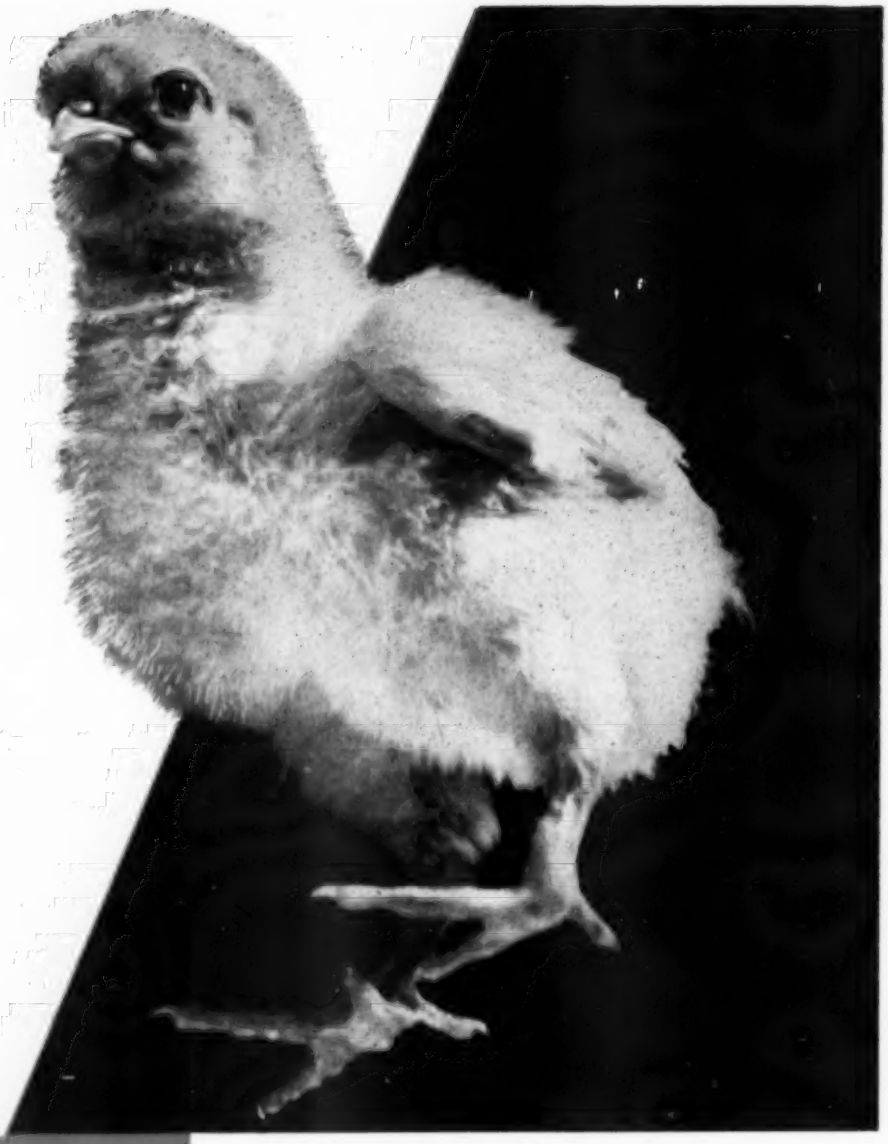
D. A. Dever, in reporting on the possibility of a reduced apple spray schedule, presented evidence in support of the present spray schedule in terms of number of applications. He reported that one to five sprays, with or without spreader-stickers, were ineffective; and that the use of spreader-stickers may allow one or two sprays to be omitted from the present spray schedule. Experimental results indicate that cover sprays incorporating DDT, malathion, parathion, or Metacide are satisfactory for codling moth control. Bud moth and fruit tree leaf roller control can be accomplished at any time in the season if the correct insecticide is used. However, in view of possible crop reduction by late applications, it is recommended that the application be made before petal fall. The suggested insecticide for this pre-bloom spray is Metacide.

K. P. Buckholtz, Department of Agronomy, reported that the use of herbicides in field crops is becoming more diversified and more specialized each year. The greater specialization makes the problem of correct application more complex, but more satisfactory control of weedy species results, — with reduced possibility of injury to crop plants. Newer applications of herbicides in field crop areas include basal spraying of brush and woody plants with 2, 4-D and 2, 4, 5-T, the possible use of MCP for control of broadleaved weeds in fields of canning peas and the use of MH to control quackgrass in high value areas. The latter application is made to the quackgrass foliage in the spring and is followed by tillage within 3 to 6 days. Subsequent growth of quackgrass is very slow and scanty, and lack of soil toxicity allows a wide variety of crops to be planted.

J. T. Medler tested a number of different commercial dessicant formulations for the dessication of alfalfa. Best drying was obtained by cutting the alfalfa and curing it in the field during a week without rainfall. Reduction of moisture by the chemicals varied from 14.8 to 2.2 per cent. Best treatments were endothal, dinitro-o-sec-butylphenol and sodium chloroacetate. The drying effect of dinitro was caused in a large part by the diesel oil formulation, since a water formulation at the same dosage has been less effective. Preliminary dessication trials in hybrid corn showed that corn treated with low rates of endothal dried out no faster than untreated corn. Germination of the corn was not affected by the treatments, but yields were reduced.

According to William G. Hoekstra, Department of Biochemistry, hyperkeratosis was consistently produced in dairy calves (100 to 500 lbs.) by topical application of certain petroleum oils (mineral seal oil grade) of a type commonly used as insecticide carriers, on the administration of one-third ounce of such oils per 100 lbs. body weight per day. Application of one-eighth ounce of oil per 100 lbs. body weight per day also produced hyperkeratosis but to a lesser degree.

R. J. Dicke presented results of a study on dairy barn fly control. During the summer of 1953, 29 dairy barns were treated with insecticide and/or kept under observation for results of general fly control. The results of the study demonstrated that effective sanitation management was mandatory for fly control. The insecticides used (methoxychlor, lindane, pyrethrum and malathion) in the absence of good sanitation practices were generally inadequate, while good control was obtained in several instances where little or no insecticides were employed. The most common and readily corrected sanitation fault was accumulation for a week or more of manure in young stock pens. Very resistant and very susceptible strains of flies were encountered. The relative response of the fly strains, however, had little correlation with the degree of control obtained, and appeared to be a minor factor compared with sanitation faults.★★



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Potash, a component of many modern fertilizers, enriches the soil, improves crop quality, helps build resistance to disease, and increases product yield.

The potash produced by the United States Potash Company has two distinct advantages in the mixing of modern commercial fertilizers. It has the highest K_2O content, and is free-flowing and non-caking —important factors in fertilizer production.

As an investment in the soil, Potash pays off handsomely in better crops and better business.

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HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

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Suppliers' BULLETINS

Monsanto Garden Products

Monsanto Chemical Co., St. Louis, Mo. announced recently two new products to be included in its garden line, and a low-cost plastic applicator for water-soluble fertilizer to lawns and gardens.

The first product, a new herbicide is "D-Leet," the only selective herbicide in the home garden field to be based on MCP, (2-methyl-4-chlorophenoxyacetic acid). The other new product is "Bogey," an all-purpose pesticide which controls a wide range of insects and plant diseases. It may be used either as a spray or as a dust. As a dust, it is available in a specially designed "dust-gun."

Monsanto has issued bulletins providing background information for the two products, listing the active and inactive ingredients, directions and cautions for use, and other general observations.

The applicator issued recently is called "Foliator," and is designed especially for use with "Folium," Monsanto's concentrated, water-soluble lawn and garden fertilizer. The new device made of styrene plastic can be used with ordinary garden hoses, nozzles, rotary or ring-type sprinklers or soakers.

•

New Garden Supply Product

A combination compost-base organic fertilizer and a potting soil is to be produced as a new gardening aid under the name "Grow Power *Planter* Mix." It is to be produced and distributed jointly by American Brand Fertilizer Co., Hobart, Indiana, and Benson-Maclean, Bridgeton, Indiana.

The product incorporates "Activo," a bacteria-biotic-enzyme composition, manufactured by the Benson-Maclean Co. Initially it is being merchandised in only one size, in what the manufacturers call a bag to "carry the average potted-plant grower through the indoor gardening season." The unit sell for less than a dollar.

•

Pulva Equipment Described

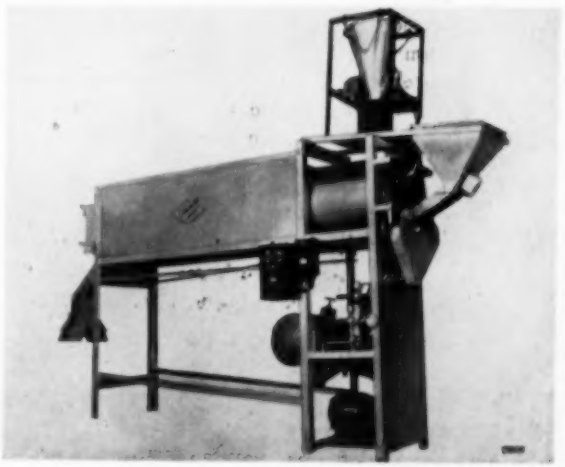
A new catalog describing the Pulva-sizer and Combin-feeders, was isued recently by the Pulva Corp., N. J. The catalog describes the uses of the two lines of equipment, illustrating their various features, and including detailed drawings of equipment, parts and auxiliary units.

•

Kromer Seed Treater

A new method of seed treatment said to correct the problem of lumpy, spotty coating of seeds, which interferes with mechanical planting, is described by O. W. Kromer Co., Minneapolis, in a bulletin on the Kromer Seed Treater.

The Kromer method of seed treatment feeds a continuous stream of seed into a revolving mixing chamber where the seed is subjected to a moist atmosphere. The seed continues through the mixing chamber and passes through a cloud of chemical dust, where it acquires a thin, uniform coat of protectant. The Kromer seed treater will handle up to 17,000 pounds of seed per hour.



New Fischbein Products

The Dave Fischbein Co., Minneapolis, Minn., manufacturer of the Fischbein portable bag closer, announced recently three new products specially prepared for correct maintenance of their bag closing machine. The products are a special lubricating oil, a cleaning solvent and a thread lubricant.

•

Cyanamid Products Booklet

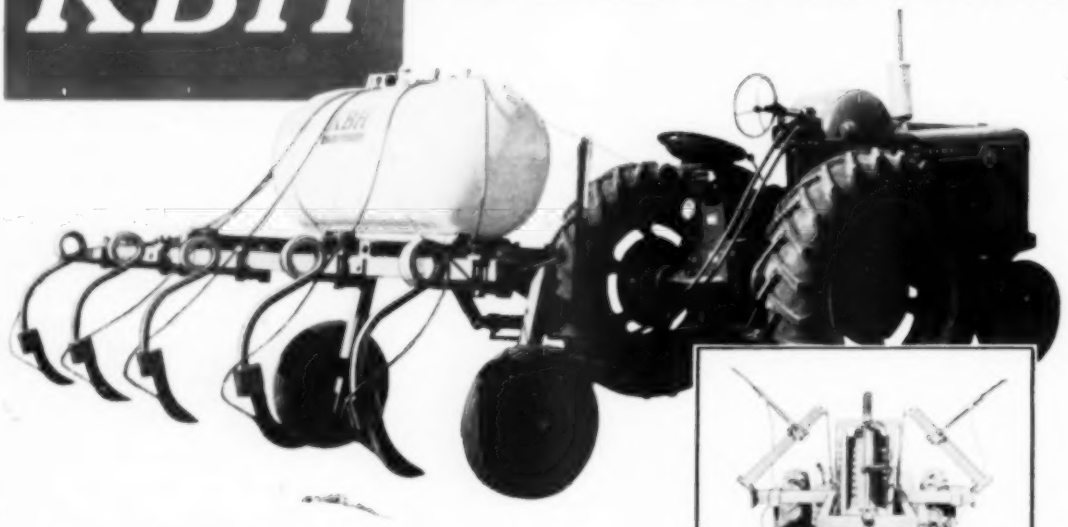
An up to date review of American Cyanamid Company's literature on some of the new products being marketed by the firm for trial use has been published and is now available. "New Product Bulletin, Collective Volume III," a 159-page booklet, offers detailed technical data on Acrylamide; 3-aminopropanol; n-tert-butylacrylamide; N,N-diallylmelamine; guanamines; 3,3'-iminobispropylamine; N,N'-methylenebisacrylamide; potassium diisopropyl dithiophosphate; surface active agents TR and BPE; and triallyl cyanurate.

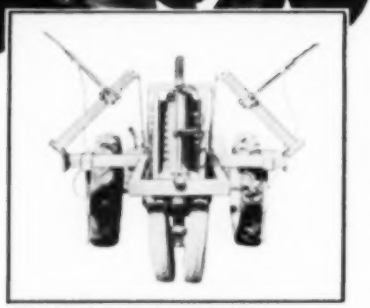
•

Soil Detergent "PR-51"

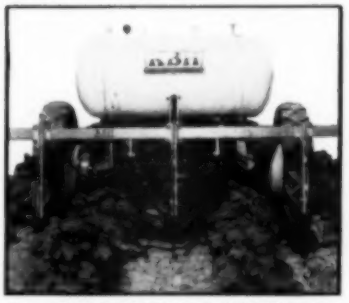
Atlantic Refining Co., Philadelphia, reports that its new wetting agent "PR-51" improves soil drainage, making earlier spring plowing possible in wet, heavy land; that it also increases yields of carrots, tomatoes and bush beans. It is reported not to be a soil conditioner, does not have to be worked into the ground, but is applied to the surface in amounts from 15 to 50 lbs. per acre. It sells at about 50 cents per pound.

KBH AMMONIA APPLICATORS





KBH DOUBLE-DUTY APPLICATOR



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To Your Business by Handling This
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Profit opportunities are unlimited in the agricultural ammonia field. Get your full share of this rapidly expanding business by offering your customers the leading, top quality line of ammonia field applicators on the market. There's a KBH Applicator for every job and for every size farm. From KBH's Front-Mounted, Rear-Mounted, and Pull-Type Applicators, your customers can pick the applicator that fits their exact needs. All KBH Applicators can be used for both pre-planting and side-dressing row crops and for broadcast application of ammonia. They're easily and quickly mounted to all popular make tractors. Extra-Strength construction gives them the ruggedness required for full-time, dependable performance. Compare all the features . . . ruggedness, dependable performance and economy. You'll see why KBH is the leading, fastest growing name in the ammonia field, today!

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MANUFACTURERS OF EXTRA STRENGTH FARM EQUIPMENT

Pkgd. Mixing Plant Offered

Packaged mixing plants for mixing dry chemicals or minerals in amounts ranging from 500 to 4000-lb. batches are in production by John W. Williamson & Sons, Montebello, Calif. The unit plants consist of a ribbon mixer with cut-in hopper, elevator, conveyor, sacking bin, motor, drives and controllers.

•

Erosion Due to Soil Conditioners

The February *Federal Research Newsletter* reported that according to USDA researchers, chemical soil conditioners may increase a soil's tendency to wind erosion. It was found that one synthetic soil conditioner did this. It made water-stable aggregates in the treated soil of a size that could be moved by wind.

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New Bibliography on Urea

A 200-page bibliography, "Feed Urea in Ruminant Nutrition" has been produced for scientists and research organizations working in the field of animal nutrition, by the Nitrogen Division, Allied Chemical & Dye Corp., New York. The book contains more than 370 abstracts of significant work to date on the subject.

•

CSC Ammonia Bulletin

Commercial Solvents Corporation, New York, has recently issued technical data sheet No. 22 on anhydrous ammonia. The bulletin presents the physical, chemical properties, specifications, uses, toxicity data, shipping and handling suggestions, and tabular data of physical properties.

•

Century Boomless Sprayer

A new type boomless sprayer that will spray a swath up to 50 feet wide or to one side only for road sides or fence rows has been announced by Century Engineering Corporation of Cedar Rapids, Iowa.

The unit consists of a single nozzle with interchangeable tips for spraying to one or both sides. A special bracket is furnished so that this nozzle may be clamped to either a vertical or horizontal spray tank or to any convenient place on the tractor.

In addition to the economy sprayer which is priced under $100.00, Century offers an Economy Kit at about $20 so farmers who already have their own boom type sprayer or pump and regulator can make up their own boomless sprayer.

•

Furan Chemical Booklet

A new 28-page booklet describing the "QO Furan" chemicals has been published recently by the chemicals department of the Quaker Oats Co., Chicago. Included in the list of chemicals is "Furafil" which is used as an anti-caking agent in mixed fertilizers; and "Hydrofuramide," used in manufacture of a fungicide.

Bag-Flattening Attachment

A new box car and truck unloader with a bag flattening attachment is described in a bulletin issued by the Flexoveyor Mfg. Co., Denver. The unloader runs at speeds of 120 feet per minute, delivering 1000 bags per hour.

•

Water Hardness Kit

Calgon, Inc., and Hagan Corp., Pittsburgh have announced recently a new "Speedy-Kit" for the field determination of water hardness. The kits include sufficient reagents for 50 to 100 tests, depending on water hardness. Sensitivity is to one grain per gallon (17.1 ppm).

NEVSOLV 200

Boiling Range	195°C (383°F) to 280°C (536°F)
Specific Gravity	.880 to .915
Color	Straw

NEVSOLV 30

Boiling Range	130°C (266°F) to 190°C (374°F)
Specific Gravity	.835 to .845
Color	Water White

These NEVSOLVS are active solvents for DDT, BHC, 2-4-D esters, etc., and are especially clean with good odor.

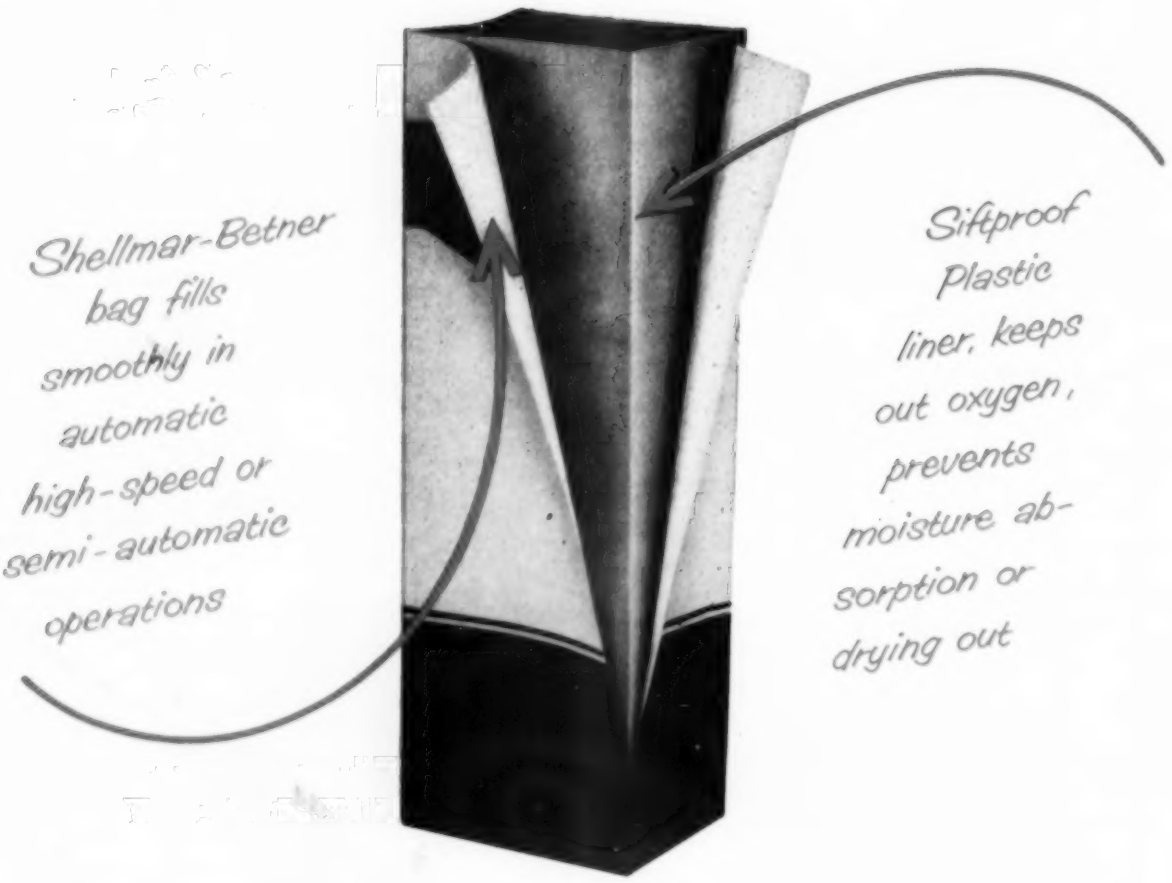
Neville's new NEVSOLV series is ideally adapted to the insecticide and herbicide solvent field.

These two popular grades have individual characteristics, but other boiling ranges are available to meet your requirements.

NEVILLE CHEMICAL CO.
PITTSBURGH 25, PA.

AC-1

How Flav-O-Tainers protect your agricultural chemicals longer


Shellmar-Betner bag fills smoothly in automatic high-speed or semi-automatic operations
Siftproof plastic liner, keeps out oxygen, prevents moisture absorption or drying out

If you could take apart a Shellmar-Betner Flav-O-Tainer bag, and examine its construction, you would see why so many packers of agricultural chemicals, insecticides, fertilizers and similar products now depend on it to protect their products.

Flav-O-Tainer is more than a paper bag. Each durable Flav-O-Tainer has a siftproof plastic lining and hermetically-sealed, inner seams. After it has been filled, it can be finally heat-sealed, film to film. That means your dry products stay dry—moist products stay moist. The potency and aroma of non-edible, hydroscopic materials are locked in, while undesirable moisture and oxygen are locked out.

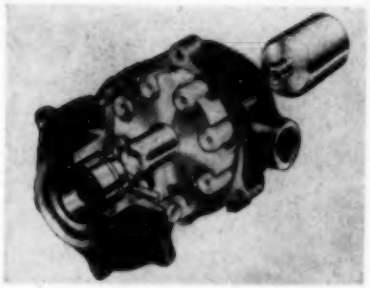
Add to this protection the easy, economical filling and the crisp, colorful printing of the Flav-O-Tainer bag, and you have the compelling reasons for its growing popularity. May we show you how Continental Tailor-Made Package Service can help you?

CONTINENTAL CAN COMPANY

SHELLMAR-BETNER

FLEXIBLE PACKAGING DIVISION

MT. VERNON, OHIO



Pump for Liquid Fertilizers

Corrosive liquid fertilizers can now be handled effectively with the improved Model 750 direct drive tractor pump, according to Hypro Engineering, Inc., national manufacturers of roller and rubber impeller pumps with headquarters in Minneapolis, Minn.

Designed with stainless steel seals and stainless steel inserts in the nylon rollers, the pump with type 2 Ni-Resist case and rotor contains no copper and shows great resistance to wear. The pump has a pressure range from 0 to 350 pounds per square inch and delivers approximately 15 gallons per minute at 600 RPM, 0 lbs. pressure, and 11 gallons per minute at 150 lbs.

In addition to handling corrosive liquid fertilizers with a minimum of wear, the Model 750 also is effective for regular weed, insect and cattle sprays, the manufacturer states.

•

C-IPC Weed Film by CSC

A 16mm sound motion picture film in color depicting proper weed control procedures in cotton with Chloro-IPC has been produced by the Columbia-Southern Chemical Corp., Pittsburgh, and is now available for showing to interested groups.

The film, "Weed Control in Cotton with Chloro-IPC," tells the colorful story of progressive cotton farming in addition to presenting a step-by-step guide for the proper use of the dramatic new herbicide Chloro-IPC under great variations in weather and soil conditions.

Educational and instructive throughout, the motion picture stresses the fact that although Chloro-IPC has proved to be one of the most effective pre-emergence herbicides yet developed, it is not to be regarded as a substitute for good farming practices. Methods of preparation and application are detailed as are mixing instructions and uses of various types of spraying equipment.

•

Union Special Bag Bulletin

A new illustrated bulletin entitled "Here's How to Close Small Paper Bags" has been issued recently by Union Special Machine Company, Chicago manufacturer of industrial sewing machines.

Emphasizing the importance of speed and economy in closing small paper bags, the new brochure—Bulletin 100—describes and illustrates the various Union Special equipment designed for these operations.

•

New Thayer Literature

A new catalog sheet, describing the company's automatic gross weight filling scale and automatic net weight filling scale, has been prepared by Thayer Scale and Engineering Corporation, Rockland, Mass.

Have you these Insecticide production problems?

- *Increasing per hour production*
- *Improving product quality*
- *Reducing labor costs*

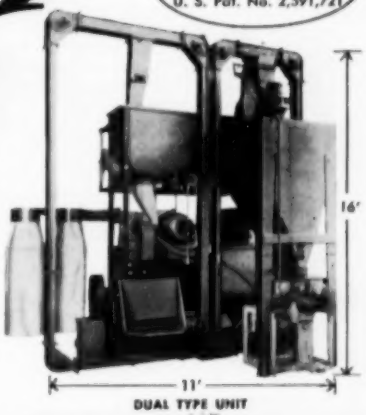
Solve them with R.T.R.* UNI-BLENDER Compounding Plants

*RTR Ready-to-Run U. S. Pat. No. 2,591,721

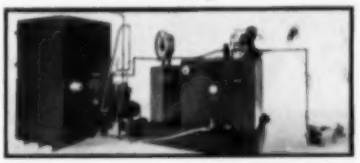
These complete, compact Ready-to-Run units provide maximum production per hour—uniform quality products—at minimum labor and other operation costs.

The Dual type plant elevates, mixes, pulverizes, blends, and packages dust concentrates and also field strength dusts, including those involving liquid impregnation. Jacketed mixers if specified.

Stock models now available in 40, 56, 70 and 100 cu. ft. mixer capacities. Other compounding and liquid formulating plants engineered to your specifications.



DUAL TYPE UNIT



RTR Uni-Blender Liquid Formulating Plants liquefy and blend toxicants used in production of liquid concentrates and liquid sprays.

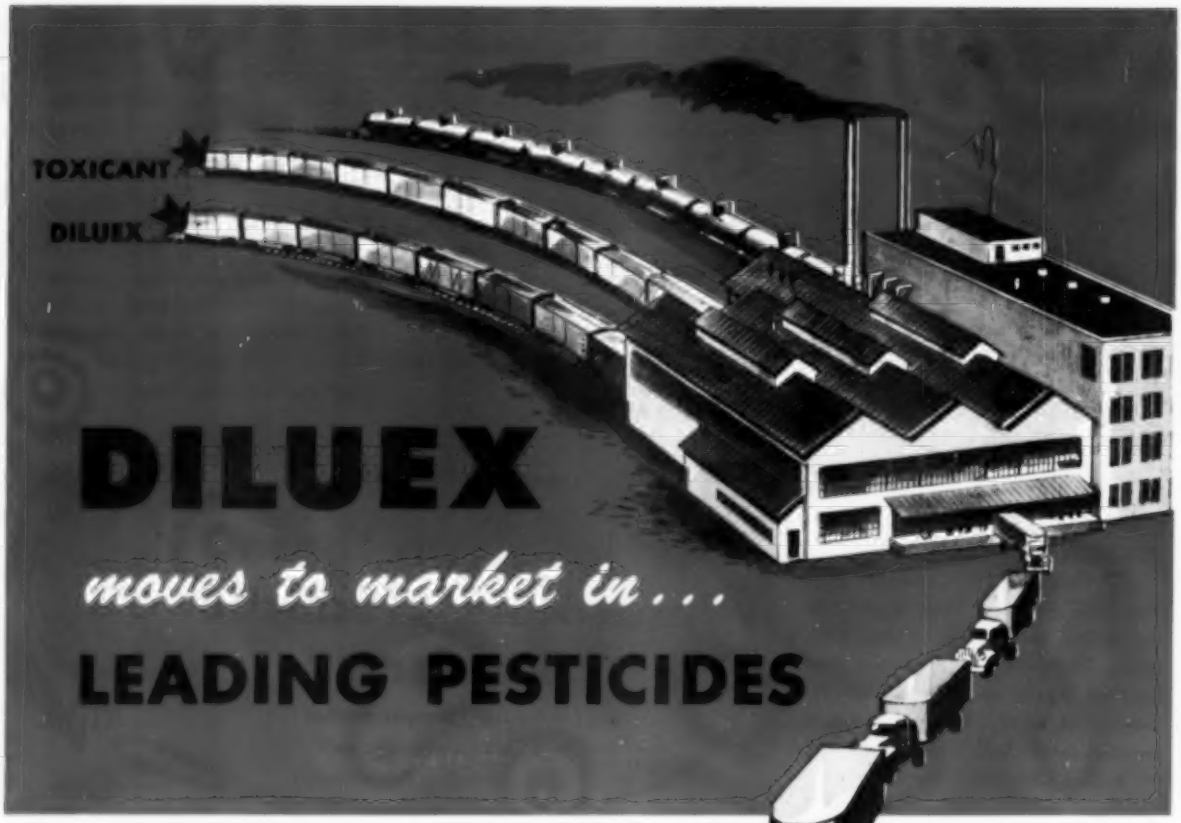
Write for technical bulletins

POULSEN COMPANY

Engineers and manufacturers of materials processing and materials handling equipment

5957 WEST THIRD STREET, LOS ANGELES 36, CALIFORNIA

Poulsen ½ page island Ag. Chemical—March, 1954



On the basis of technical study and practical experience, Floridin products, extracted and specially processed at Quincy and Jamieson, Florida, are coming into more and more general use in the agricultural chemical industry.

Are you impregnating toxaphene—chlordane—aldrin—parathion—any liquid toxicant?

Are you milling DDT, BHC, or other organics?

Formulating blended dusts?

For any of these processes, it will be worth your while to learn about DILUEX and DILUEX-A.

As grinding aids, adsorbent concentrate bases, and dust conditioners for the most exacting uses of the industry, Floridin products have won a leading place. The demand for DILUEX and DILUEX-A, increasing steadily for many years, has recently grown to multiplied tonnage. Production facilities have been enlarged accordingly, and shipments are being made without delay, by train and truck from two Floridin plants at Quincy and Jamieson, Florida. Correspondence is invited.

FLORIDIN COMPANY

Adsorbents . . . . Desiccants . . . . Diluents

Dept. M, 120 Liberty St., Warren, Pa.

INDUSTRY *Patents*

The information below is furnished by patent law offices of

LANCASTER, ALLWINE & ROMMEL

402 Bowen Building
Washington 5, D. C.

The data listed below is only a brief review of recently issued pertinent patents obtained by various U. S. Patent office registered attorneys for manufacturers and/or inventors. Complete copies may be obtained direct from Lancaster, Allwine & Rommell by sending 50c for each copy desired. $1.00 for Canada. They will be pleased to give you free preliminary patent advice.

2,659,659. AMMONIUM SULFATE PRODUCTION. Patent issued November 17, to Albert J. Shmidl, Houston, Tex., assignor, by mesne assignments, to Standard Oil Development Company, Elizabeth, N. J., a corporation of Delaware. A method for producing ammonium sulfate from sulfuric acid sludge containing dissolved carbon compounds which comprises introducing said sulfuric acid sludge into a body of anhydrous liquid ammonia maintained in a reaction zone at a reaction temperature below 125° F., reacting said sulfuric acid sludge and anhydrous liquid ammonia to form ammonium sulfate crystals, maintaining unreacted liquid ammonia in the reaction zone at all times and washing the ammonium sulfate crystals formed in the reaction zone continuously with said unreacted anhydrous liquid ammonia, removing from said reaction zone as product a slurry of ammonium sulfate crystals in a liquid ammonia solution of ammonia-soluble carbon compounds, said slurry containing at least one volume of unreacted ammonia for each volume of sulfuric acid sludge charged to the reaction zone to form the ammonium sulfate crystals in said slurry and separating ammonium sulfate crystals substantially free of carbon from said slurry.

2,660,251. INSECTICIDE SPRAY. Patent issued November 24, to John W. Birosh, Roulette, Pa. For use in connection with a dispensing apparatus for liquid insecticide wherein said apparatus includes a source of pressurized liquid insecticide; a fountain comb embodying a tube provided with lateral longitudinally spaced hollow teeth, said teeth having rounded end portions and bores terminating in openings disposed laterally of the extremities of said rounded end portions, said tube being provided intermediate its ends with a short lateral hollow shank portion externally screw threaded, a valve including a body axially, detachably and communicatively connected with said screw threaded shank and in close proximity to said tube, valve means in said body, a substantially L-shaped inlet tube having one lateral end portion communicatively connected with an intermediate portion of said valve body and having its remaining portion extending in spaced parallelism with the longitudinal axis of said body, a lever pivotally mounted on the projecting portion of said inlet tube adjacent to said valve body, an operating connection between the pivotally mounted portion of said lever and valve means in said body, and a rigid L-shaped handle rigidly secured to an intermediate portion of said valve body and having an end portion disposed in close spaced parallel proximity in relation to said lever and permitting the comb to be conveniently handled and the valve to be opened and closed by the same hand used for holding said handle.

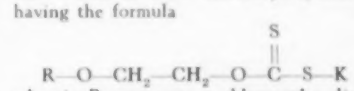
2,661,273. HERBICIDAL COMPOSITIONS. Patent issued December 1, to Arthur H. Schlesinger Dayton, Ohio, assignor to Monsanto Chemical Company, St. Louis, Mo. A herbicidal composition comprising an oil-in-water emulsion of a p-cyclohexylphenyl alkyl ketone in which the alkyl radical has from 1 to 4 carbon atoms, said ketone being present in said emulsion in a quantity which is toxic to plant life.

2,665,202. ORGANIC THIOCYANATE HERBICIDES. Patent issued Jan. 5, to David T. Mowry and Arthur H. Schlesinger, Dayton, Ohio, assignors to Monsanto Chemical Company, St. Louis, Mo. A herbicidal composition including a carrier and containing 2-phenoxyethyl thiocyanate as the active ingredient, said thiocyanate being present in said composition in a phytotoxic concentration.

2,665,203. HERBICIDAL METHOD. Patent issued Jan 5, to William S. Emerson and Robert A. Heimsch, Dayton, Ohio, assignors to Monsanto Chemical Company, St. Louis, Mo. A method of destroying undesired plants which comprises applying to said plants a toxic quantity of a herbicidal composition including as the active ingredient a quinoline compound having the formula

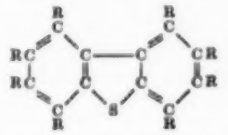
in which Alk denotes an alkyl radical of from 1 to 4 carbon atoms and R is selected from the class consisting of hydrogen and the nitro radical.

2,665,204. METHOD AND COMPOSITION FOR THE CONTROL OF UNDESIRABLE VEGETATION. Patent issued Jan. 5, to Arthur W. Swezey, Garden Grove, Calif., assignor to The Dow Chemical Company, Midland, Mich. A method for the suppression of the growth of undesirable vegetation which comprises the step of exposing the seeds and emerging seedling rootlets of such vegetation to the action of a growth inhibiting amount of a potassium xanthate of a chloroaryloxyethanol having the formula



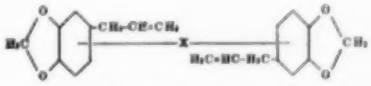
wherein R represents a chloroaryl radical.

2,665,234. DIBENZOTHIOPTHENES AS FUNGICIDES. Patent issued Jan. 5, to Lyle D. Goodhue, Bartlesville, Okla., and Carolyn E. Tissol, St. Paul, Minn., assignors to Phillips Petroleum Company. A method for the control of fungus which comprises applying to the fungus a composition containing as its sole essential fungicidal ingredient a compound represented by the general formula



wherein the R's are selected from the group consisting of hydrogen alkyl, halo, nitro, and amino groups; the R's can be different and when the R's are alkyl groups they shall contain not to exceed three carbon atoms.

2,665,233. INSECTICIDES AND INSECTICIDAL COMPOSITIONS. Patent issued Jan. 5, to Oscar F. Hedenburg, Pittsburgh, Pa., assignor, by mesne assignments, to Rex Research Corporation, Toledo, Ohio. An organic chemical compound having the structural formula



in which X is a radical selected from the group consisting of CH_2 and $CH_2—O—CH_2—O—CH_2$.

2,665,973. PROCESS FOR PRODUCING FINELY GROUND SULFUR OF NONCAKING CHARACTER. Patent issued Jan. 12, to Ralph Eugene Morningstar, Columbus, Ohio, and George H. Whipple, Wilmington, Del., assignors to Mathieson Chemical

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Wyandotte's new research laboratories provide modern testing and development facilities . . . experienced scientists are devoted to the development of new products and processes consistent with our raw materials and manufacturing background. Improvement of existing products and customer assistance are also major assignments of research. Wyandotte's "*service-scientists*" invite your inquiry and are available to help search out technical and production economies.

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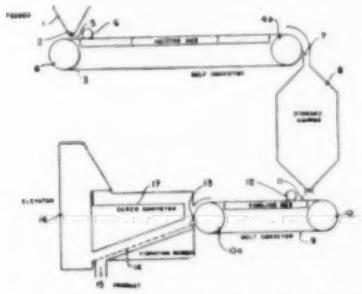
Corporation. A process for producing finely ground sulfur of non-caking character which comprises spreading finely ground sulfur on a heat-conducting surface in the form of a thin layer, heating the sulfur layer to a temperature in the range of about 95° C up to the melting point of the sulfur, discharging the heated sulfur into a hot



storage zone, withdrawing the sulfur from said storage zone after sufficient time to effect such conversion and in less than about 24 hours, cooling the surface below about 46° C. and reducing the treated mass to particle form.

2,667,412. HERBICIDAL COMPOSITION. Patent issued Jan. 26, to David T. Mowry and Arthur H. Schlesinger, Dayton, Ohio, assignors to Monsanto Chemical Company, St. Louis, Mo. The method of destroying undesirable plants which comprises treating said plants with a toxic quantity of a herbicidal composition containing allyl cyanoacetate as the active ingredient.

2,667,438. SCREWWORM FLY CONTROL. Patent issued Jan. 26, to Leo R. Gardner, Berkeley, Calif., assignor to California Spray-Chemical Corporation, Richmond, Calif. An insecticidal composition suitable for the control of the American screwworm fly comprising about 5—25% by weight of p,p'-dichlorodiphenyltrichloroethane, about 2—10% by weight of hexachlorocyclohexane containing at least 50% of its gamma isomer, about 5—15% by weight of a water-soluble alkylphenoxy polyethoxyethanol emulsifying agent, and about 40—70% of a predominantly alkyl aromatic hydrocarbon solvent.

NEW TRADE MARKS

ATTAK, in capital letters, for insecticide. Filed Feb. 5, 1952, by R. M. Hollingshead Corp., Camden, N. J. Claims use since March, 1946.

DIAZINON, in capital letters, for insecticides. Filed June 26, 1953, by Geigy Co., Inc., New York City. Claims use since May 11, 1953.

BETLENE, in capital letters, for bean beetle repellent. Filed April 24, 1953, by Willard A. Keltner, doing business under the name Keltner Chemical Co., Gardendale, Ala. Claims use since April 2, 1952.

THOMPSON-HAYWARD, man pouring chemical by letters which say "Another Thompson-Hayward Product, with the words "Another" and "Product" disclaimed apart from the mark, for herbicides, insecticides, fungicides, rodenticides, fumigants and disinfectants. Filed May 20, 1953, by Thompson-Hayward Co., Kansas City, Mo. Claims use since February, 1945 as to the complete mark and "Thompson-Hayward," and since 1933 for emblem featuring letters "T-H."

PERK, in capital letters, for agricultural spray or dust having insecticidal and fungicidal properties with incidental nutritional properties. Filed May 15, 1953, by Wilson & Toomer Fertilizer Co., Jacksonville, Fla. Claims use since May 1, 1953.

PORT BRAND, in capital letters, disclaiming word "Brand," for insecticides. Filed March 5, 1953, by Port Fertilizer & Chemical Co., Los Fresnos, Tex. Claims use since August, 1941.

RATTUNNL, with long bar over second "T," for rodenticides sold in a trap-like collapsible carton. Original filed, act of 1946, Principal Register, Aug. 14, 1952; amended to application, Supplemental Register, July 24, 1953, Serial No. 633,934. Claims use since March 25, 1952.

THOMPSON-HAYWARD, square block, with black tag attached, for herbicides, insecticides, fungicides, rodenticides, fumigants and disinfectants. Filed May 8, 1953, by Thompson-Hayward Co., Kansas City, Mo. Claims use since Jan. 7, 1952.

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ALL GRADES OF DUSTING AND WETTABLE SULPHURS

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FLAKE • LUMP • POWDER

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AVAILABLE IN 24 GAMMA AND IN 36-40 GAMMA

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NOTICE

Robertson FUNGICIDE

(copper in a novel form)

Is Now Available

For
Tomatoes
Potatoes
Celery
Avocados
Cucumbers
Cantaloupes
Watermelons

After highly successful results in field tests by plant pathologists in all parts of the country, Robertson Fungicide has now been made available in commercial quantities. This new product consists of pure metallic copper in extremely fine powder form. Each minute particle is coated with regenerative cuprous oxide. Robertson Fungicide has been found to have excellent physical properties for adhesion and ease of distribution when used either as a dust or a spray. Despite its low phytotoxicity it has very good fungicidal activity. For further information concerning this highly effective new fungicide, use the coupon below.

H. H. Robertson Company

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Offices in Principal Cities

☐ Please send me free technical information concerning Robertson Fungicide.

☐ Please send me a small free sample.

Name _____

Address _____

Firm _____

☐ Distributor ☐ Manufacturer ☐ Grower

ARMOUR, word "Armour," with large letter "A" depicted above it, for fertilizers. Filed Feb. 24, 1953, by Armour and Co., doing business under the trade style Armour Fertilizer Works, Chicago. Claims use since Nov. 1, 1952, on the mark and since 1896 as to "Armour."

FERTILAID, in open capitals, with a key beneath, for organic soil conditioner and fertilizer. Filed Dec. 19, 1952, by Fedil C. Porter, doing business as Gulf Coast Organic & Minerals Co., Pharr, Tex. Claims use since Oct. 1, 1952.

FERTIL-ADE, in capitals, with word "Fertil," disclaimed apart, for plant food. Filed June 1, 1953, by Smith Equipment and Supply Co., Chicago. Claims use since Oct. 13, 1949.

FOUR LEAF, in capital and small capital letters, and four-leaf clover, both for powdered phosphate rock for use as a fertilizer. Filed Sept. 6, 1952, by International Minerals & Chemical Corp., Chicago, Ill. Claims use since July 29, 1921.

VITREA, in open capitals, for chemical fertilizer. Filed June 22, 1953, by Deere & Co., Moline, Ill. Claims use since May 28, 1953.

ZEST, in capital letters, for liquid fertilizer. Filed June 22, 1953, by William W. Prichard, doing business as The Zest Co., Swampscott, Mass. Claims use since June 1, 1953.

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To Study Krilium Use

Norvald C. Gomness of Spokane, Wash., has become a member of the development department of Monsanto Chemical Company's Merchandising Division, it was announced recently by Otway W. Rash, the division's development department manager.

Gomness will be engaged in development of large scale applications of Krilium soil conditioners and other garden products. The applications of Krilium will include construction of golf courses and athletic fields as well as commercial agriculture and horticulture.

In 1950 Gomness was graduated from Washington State College with a B. S. degree in horticulture, and in 1951 completed graduate work at Colorado A & M College, receiving his M. S. degree in horticulture with a specialty in soils.

INSECTICIDES STUDIES

(From Page 35)

ate systox and isosystox in appreciable quantities.

Partition chromatography is another technique which will result in the eventual elucidation of the com-

plex biochemistry of the systemic insecticides. Column chromatography has been used by Heath (1952) to distinguish the metabolites of isosystox in plant tissues. Recently, we have perfected methods for the more convenient reversed phase chromatography of both the systox and schradan compounds (Metcalf and March, 1953, and March, *et al.*, 1954). Paper chromatographic techniques are ideally suited for work with radiotracers and provide a quantitative method for determining not only the various constituents present, but also the quantitative measurement of the amounts. A brief description of the methods used may be of interest. Small strips of filter paper about 2 x 17 cm. are impregnated by dipping with suitable substrates, silicone 550 for systox and ethylene glycol for schradan. The plant or animal tissues containing the P^{32} tracers for resolution are extracted in chloroform or other suitable solvents, and the extract is evaporated to dryness under a gentle current of air. The residue is taken up in about 50 microliters of acetone and this is applied to a small spot at the botom of the dried paper strip. The paper is then placed in a test tube, containing one to two ml. of a suitable mixture of solvents, chloroform-ethanol-water for systox, and toluene-benzotrichloride-carbon tetrachloride for schradan. As the solvent mixture slowly flows upward along the paper strip, the various compounds present move upward at differing rates depending on their solubility in the solvent phase and the degree of retention by the impregnated-paper substrate. After the solvent has moved nearly to the top of the paper, it is dried and the position of the various compounds present located by the radioactivity. Using such a method systox and isosystox can be conveniently separated into two distinct spots as determined by radioautography on X-ray film (figure 5). When the paper is counted in 0.5 cm. sections by passing under a Geiger tube covered with a 0.5 cm. slit, the total radioactivity in each spot can be measured and graphed, providing a quantitative determination of the components. This technic has been applied to plant products treated with both systox and isosystox. Such studies have shown that systox penetrates the plant tissues relatively slowly but is metabolized therein within a few hours into a metabolite which is considerably more toxic and more readily translocated. Isosystox penetrates into the plant much more rapidly and is translocated without metabolism, but within 24 to 48 hours all the isosystox in the plant tissues studies was found to be converted to a more toxic metabolite. The isosystox metabolite accumulates in plants from 5 to 10 times as rapidly as the systox metabolite. By extracting the metabolized products from the paper, a number of their properties have been determined and the clarification of their chemical structure is presently underway. By paper chromatography of schradan it has been possible to separate the various compounds formed in plant and animal tissues. Detailed reports of these studies are in the process of preparation.

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TENNESSEE TRI-BASIC COPPER SULPHATE
TRI-BASIC Copper Sulphate is a chemically stable copper fungicide containing not less than 53% metallic copper. TRI-BASIC Copper Sulphate can be used as a spray or dust on practically all truck crops and citrus crops. Control persistent fungus diseases—correct copper deficiencies from a nutritional standpoint. Use TC TRI-BASIC Copper Sulphate.
COP-O-ZINK NEUTRAL COPPER ZINC
COP-O-ZINK is a new, neutral copper-zinc fungicide containing 42% copper and 11% zinc. COP-O-ZINK gives a superior performance in control of fungus diseases. COP-O-ZINK composition of two essential elements gives it added value in correcting deficiencies of zinc and copper, and in stimulating plant growth. COP-O-ZINK is compatible with all inorganic and organic insecticides. No lime is required. For use in spraying or dusting.
NU-Z NUTRITIONAL ZINC
NU-Z contains 33% metallic zinc. It is a neutral zinc compound which does not require the addition of lime for direct foliage application. NU-Z gives excellent coverage and adherence to plant foliage, thus rendering it available over a longer period of time. Safe for direct application. For zinc deficiency and plant nutrition—use as a spray or dust.
COPPER SULPHATE
ZINC SULPHATE
MAGNESIUM SULPHATE
MANGANESE SULPHATE
BORON
FERRIC IRON SULPHATE
The modern farmer is insisting more and more that his fertilizer be a completely mineralized fertilizer. He is insisting on mineralized fertilizer because the results have been so conclusive—healthier plant growth, greater crop yield, and larger dollar profit per acre.
Mineralized fertilizer will stimulate fertilizer sales for you . . . produce greater tonnage volume . . . more satisfied customers . . . and increased profits.
As basic producers of minerals, we would like to discuss with you the advantages of mineralized fertilizer and how mineralized fertilizer will increase your tonnage and profits.
For detailed information, phone, wire or write—
TENNESSEE TC CORPORATION
617-39 Grant Building, Atlanta, Georgia

The investigations conducted to date with radiotracers in the study of systemic insecticides have indicated something of the promise that this technic shows not only for the basic studies of the complex biochemical behavior of these materials but also for routine analytical determinations of the magnitude of residues in treated produce. The diligent employment of such methods is certain to greatly extend our knowledge in these fields.

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GUEST EDITORIAL

(*From Page 31*)

of agriculture. It appears to me that this is an ideal situation for the marketing of products which are in such general demand.

If we look at the situation from the standpoint of agricultural commodities, we find that the present administration is attempting to increase farm efficiency to give the farmer a greater net from his operations. Certainly pesticides, when properly used, provide a real and practical source for increasing the net take from any unit of agricultural production. Most farmers are still not aware of what can be done through protection of crops against losses due to insects, diseases and in many instances, the full value of the use of pesticides is not obtained because of improper timing, improper number of applications or other factors which could be overcome with a little additional information presented for the farmers' consideration. The market is here.

Not only does the situation in ag-

New, big, square, triple-screened crystals of new-process ARCADIAN Nitrate of Soda provide all the advantages of quick-acting nitrate nitrogen and are easier to spread than ever before. This freer-flowing, greatly improved physical condition makes new ARCADIAN Nitrate the best nitrate of soda ever produced. Your customers will want it for top-dressing and side-dressing early this spring. Production is now under way, so ask us now about supplies of *improved* ARCADIAN Nitrate of Soda.

A-N-L® Nitrogen Fertilizer is another dependable nitrogen for side-dressing and top-dressing. This pelleted product provides 20.5% nitrogen—10.2% as nitrate and 10.3% as ammonia.

NITROGEN DIVISION Allied Chemical & Dye Corporation

New York 6, N. Y. • Richmond 19, Va. • Hopewell, Va. • South Point, Ohio • Atlanta 3, Ga. • Columbia 1, S. C. • San Francisco, Calif. • Omaha, Neb.

NITROGEN DIVISION ALLIED CHEMICAL

riculture today present a real opportunity for those who wish to sell chemical aids to agriculture, but no other industry is competing directly with the pesticide industry for this market. Our competition is primarily obsolete farm practices. Fortunately, the use of pesticides complements the use of fertilizers and increases farm mechanization. The insurance value of pesticides to protect investments is still not recognized.

It's true that farmers will invest only a certain amount of their gross dollar for agricultural aids, but this is dependent largely on the net return which is possible from the use of such aids. We have an excellent record which is available to everyone to show the farmer that the use of pesticides pays. We are supported in this outlook by research which has been done by the Land Grant Colleges and the United States Department of Agriculture. We can do a better job of bringing the results of this research to our customers. We also have other obligations to the public which extend beyond the farmer to the man in the street. We are continuing to tell our story on a factual basis to them and have been able to make some progress by assisting in the preparation of improved legislation dealing with the production, marketing and use of our products.

For some time our industry has been aware of the weaknesses in the Federal Food, Drug and Cosmetics Act and the hardships which have arisen from the cumbersome procedures involved in obtaining residue tolerances for pesticides. The new Miller Bill, H.R. 7125, which is now in the House Interstate and Foreign Commerce Committee, is a proposal for improving the procedures to obtain a tolerance on a pesticide. It is now over four years since the first hearings were held to obtain data for establishing pesticide residue tolerances and this Miller Bill is a manifestation of progress along that line. The passage of the bill will form a foundation upon which we can base much factual information which will allay the public fears about the use of pesticides in agriculture. The bill itself is in the public interest and, although it will increase the procedural work load of the pesticide industry, this change in the Food and Drug Act will serve to place our industry on a much sounder basis.

Certainly all these plus factors as they pertain to our industry balance favorably the adverse factors with which we must contend today. It is not my intention to infer that our problems are so small that they deserve little attention. Their solution is necessary in order to have a sound basis for continued progress and expansion of the industry. It seems to me that if we could continually accent the positive factors and at the same time work from day to day to overcome our problems, much greater progress would result. Our meeting in Houston, Texas, this month can serve as a sounding board for many of the problems with which we are faced, and through the expert speakers whom we have scheduled for this meeting many answers to our difficulties will arise.

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New* Miller Bill H. R. 7125

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- *Protects consumers of food by limiting the amount of pesticides which can appear on farm produce*
- *Limits the time for FDA to establish pesticidal residue tolerances*
- *Provides standards upon which directions for use can be based*
- *Aids growers by establishing guideposts to follow in using pesticides*

*This is the new Miller Bill substitute for H.R. 4277 of the last session of Congress. It retains the principles of H.R. 4277 with some changes in technical phraseology and procedures for establishing tolerances. We urge all those interested in public health and agriculture to support this bill through their Congressmen. For details write the Executive Secretary.

NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

910 SEVENTEENTH STREET, N. W. WASHINGTON 6, D. C.

FUNGICIDE TESTS

(From Page 62)

this material was even safer in 3X concentration with blower than at 1X with high pressure spray. "Captan of little value as eradicant, but Crag 341 mercury, or LS, at 6 quarts does the job." For apple blotch in Oklahoma, first choice went to Sulforon and Orthocide, with Fermate in second place on account of plant safety, although Bordeaux gave best control. Russeting is the problem.

Nut Trees

The coppers gave better control of walnut bacteriosis in Oregon than Manzate or Mercusan. Bordeaux gave best control of pecan scab in Florida and Georgia, Vancide 51ZW failing.

Citrus

Phytophthora brown rot of lemon was best control'ed by copper sprays, though Orthocide shared first choice in California. Septoria spot was controlled best by coppers and by Dithane Z78.

Ornamentals

Against iris leaf spot, carnation blight, aster rust, and snapdragon rust, Zineb was the most successful out of 9 materials tested in New York. Zineb was also tops in Connecticut against snapdragon rust. There is some evidence that a fungicide which is good for one rust may not be equally good against another. Crag 341 and a special Cornell mixture containing Zineb were next to straight Zineb. Systox gave no systemic control of black spot of rose in Arkansas.

Small Fruits

In Oklahoma, Anthracnose of blackberry was controlled better by Bordeaux in the delayed dormant than by Lime sulfur, two applications being less effective than 3, and Fermate less effective than the other two materials. Ferbam and Dithane were first and second choice against Anthracnose of red raspberry in Washington. Actidione and Tag 331 each gave control of a leaf blight of strawberry in Michigan.

Potatoes

Captan dust looked good in Florida against seed piece decay, while late blight was controlled best by Captan, Ethylene bis trisulfide, Nabam, Zineb, and Copozinc and Phygon. In New Hampshire Manzate and Dithane looked better for late blight than the coppers and several other things. In Delaware B622 was "outstanding" in controlling early blight.

Tobacco

Blue mold was controlled best by Nabam and Manzate in North Carolina, with Fermate and Vancide next and Thiolutin giving no control either in North or South Carolina or Florida. In South Carolina, Vancide, Nabam, and Fermate all controlled it, while in Florida first choice was Dithane Z-78.

Vegetables

Downy mildew of lima bean was controlled by Manzate, Dithane, Cop-O-Zinc, Captan, and Tribasic on Long Island.

In Florida LO738 controlled Helminthosporium leaf blight of sweet corn about as well as Nabam and Zineb. Tomato late bight was controlled well by Nabam and Zineb, but LO738 was only one of 16 newer things thought worth further listing.

At Homestead, Florida, the following materials fell down against late blight: Cunilate, Cunilene, Neo-Vita, 48-CS-36, 48-CS-73, and BFG 3,5-D. The better materials included Zineb, Manzate, Nabam-Techmangan, Nabam + Zinc.

In Maryland, tomato early blight and Stemphylium leaf spot were better controlled by Zineb. Manzate, and Zineb followed by D14 than by the fixed coppers, while in New Hampshire Captan was preferred and coppers were least effective.

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producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap.

A Spergon (chloranil) dust or spray gave the best control of downy mildew on cabbage in South Carolina and Florida.

The antibiotics Streptomycin and Terramycin showed up well only against halo blight of bean (Beltsville), though Actidione controlled a leaf blight of strawberry in Michigan as well as Tag 331.

Ovotran in California against powdery mildew of cucumbers was given top rating over several things because it also controlled mites.

The coppers were clearly superior to the organics in Beltsville against angular leaf spot of cucumbers, but a combination of copper and Nabam seemed better for downy mildew, and in South Carolina the best for mildew control as well as anthracnose were Manzate and B622.

Manzate, Zerlate, and Dithane gave the best control of onion downy mildew in Washington and British Columbia, while onion blast in New York was controlled by Nabam, Manzate, Vancide, Orthocide, and Fermate. In general, sprays were more effective than dusts.

Orthocide was first choice against downy mildew of spinach in California, although Iron Nabam, Manzate, and Nabam looked better in a second test.

Nabam and Vancide were very effective in control of Cercospora leaf blight of carrot in New York.

Seed Treatments

Of seven fungicides tested at Ottawa for their ability to improve emergence of fifteen different vegetables, it seems noteworthy that Phygon was either first, second or third place in 11 out of 15 tests. Panogen was first, second or third place in 9 out of 15 tests, but no better than the check in 5 others. Vancide was first or second place in 7 out of 15 trials, but no better than the checks in all others. Merculine was first, second or third in 5 out of the 15 trials, Ceresan was no better than the checks in 9 out of the 15 trials, Spergon in 10 out of 15 trials and Mercusol was no better than the checks in 13 out of 15 cases, and was next to the lowest in the other 2. In California Panogen was thought superior to Ceresan M for cotton seed treatment.

Soil Treatments

Peanuts and Tobacco

Against root rot of peanuts in Alabama, Dowfume 85 did better at 4½ gallons broadcast than at 2 gallons in the row. Stauffer N521 was very effective against nematodes of tobacco, and further work seems warranted with Penn Salt 1353 and VC 1-13 also, but in British Columbia N521 was ineffective against Verticillium wilt of tomato, and in Alabama against collar rot of peanut.

Root rot of snap beans on Long Island was controlled better by steam and formaldehyde than by Pentachloronitrobenzene, CBP, Chloropicrin, or Methylbromide.

DDT RESIDUES

(*From Page 53*)

ployed for control of either first- or second-generation borers. DDT residues on corn plants used for silage and stover on which cattle are allowed to feed are of importance to corn producers and cattle feeders.

Study of the residues from DDT dusts and sprays applied for control of second-generation European corn borers was made in fields of Silver Cross Bantam canning corn. Applications were made at the rate generally recommended for borer control, two pounds of technical DDT per acre in dusts and 1.5 pounds in sprays. Three or four applications were made in each field at intervals of 4 to 5 days between August 6 and 24. Samples of plants for residue analyses were collected at ear harvest (13 to 21 days after the final application), which is the normal time for ensiling canning corn plants. Each sample consisted of five 2 plant replicates.

Residues on the samples at harvest ranged from 12.8 p.p.m. after three dust treatments to 42.2 p.p.m. after four spray treatments. These data clearly demonstrate the hazard of contaminating corn plants by the application of DDT for control of second-generation corn borers in canning corn.

A second experiment was designed to demonstrate how late in the growing season DDT could be applied to corn plants without danger of contaminating silage or stover. Corn was planted on May 4 and May 16. Starting on June 12, sprays were applied at weekly intervals until July 17. Suspension and emulsion sprays were applied at the rate of 1.5 pounds of technical DDT per acre. On June 12 two plots of each age of corn were sprayed with each formulation. On June 19 one of the plots sprayed on June 12 and two additional plots were sprayed with each formulation. By the same system additional sprays were applied on June 26, July 5, and July 10. On July 17, one plot sprayed on July 10 and one additional plot was sprayed with each formulation. Thus in each age of corn there were six plots that received single applications and five plots that were sprayed twice.

Samples for residue analysis consisted of four 10-plant subsamples. Plots receiving a single treatment were sampled after the spraying; plots receiving two treatments were sampled after the second spray, and both series of plots were sampled a second time at ensiling (August 16).

With the initial residues the smaller the corn plant the greater was the residue. There are two reasons for this: First, the proportion of plant surface to weight is greater in small plants than in larger plants; and second, the texture of the surface of young plants is more absorptive than that of older plants. The residue from the emulsion sprays was always greater than that from the suspension sprays on plants of comparable size. When a suspension was used, the initial residue from two applications

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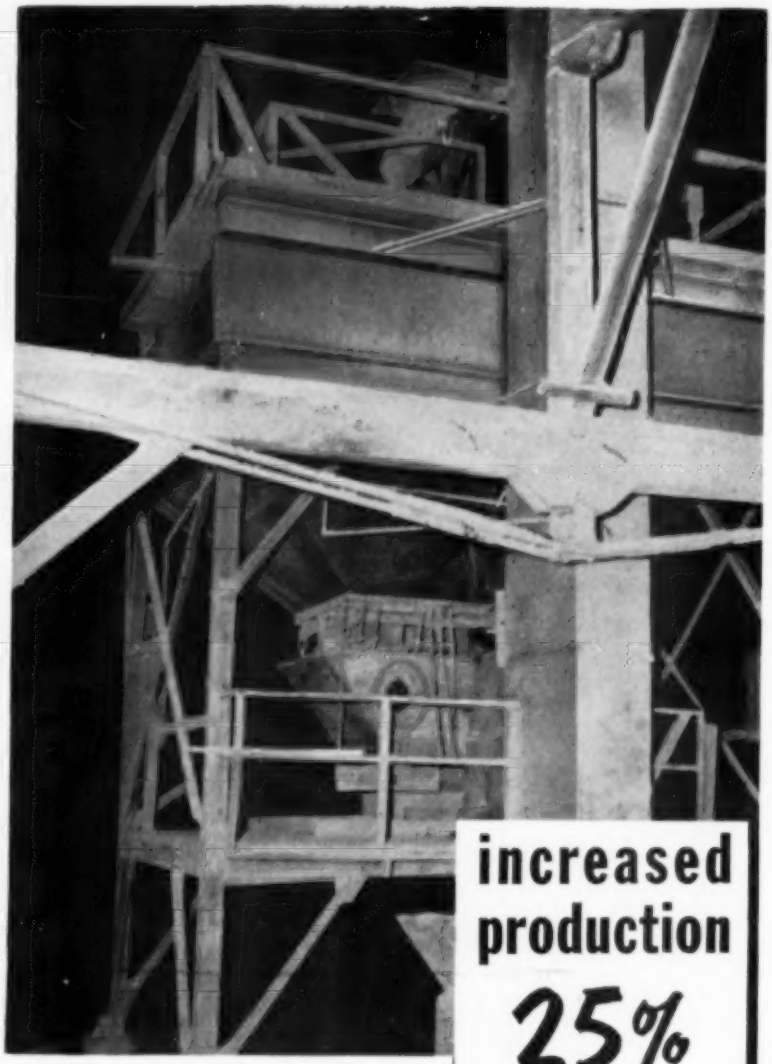

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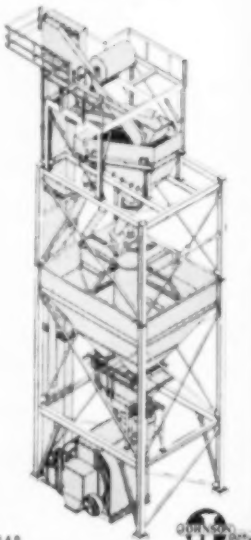

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a week apart was not much greater than that from a single application on the date of the second spray, but when an emulsion was used, the initial residue was appreciably greater from two applications than from one.

The samples collected at corn ensiling time showed that when a single application of a suspension spray was made before the corn was 69 inches high, the residue on the corn plants was less than 1 p.p.m. of DDT. When two applications were made, it was more than 1 p.p.m. of DDT, if the second application was made after the corn was 59 inches high. A single, or two emulsion sprays applied a week apart after the corn was 44 inches high left a residue at corn ensiling time of more than 1 p.p.m. of DDT.

Summary

STUDIES of the magnitude and fate of DDT residues on corn plants were conducted as a cooperative project between the Entomology Branch and the Iowa Agricultural Experiment Station.

These studies demonstrated that maximum residues could be obtained with a minimum spray volume, 2.5 gallons per acre, but that the distribution of the residue on the plant surface was improved if the volume was increased to 20 to 40 gallons of spray per acre. With a volume of 80 gallons of spray per acre there was an excessive run-off of insecticide.

Varying the spray pressure from 20 to 160 p.s.i. had little effect on the magnitude or distribution of insecticide residues on corn plants.

A comparison of the effect of spray nozzles demonstrated that an 80-degree fan nozzle left a better distribution of residue than either a hollow-cone or a 65-degree nozzle. Multiple nozzle arrangements effectively controlled the distribution of residues.

Insecticide formulations affect deposition, distribution, and persistence of DDT residues on corn plants. Dust formulations left lighter residues than spray formulations. Residues from dusts were increased by the presence of dew on treated

plants. Suspension sprays deposited greater residues than dusts, and emulsion sprays deposited greater and more persistent residues than either suspension sprays or dusts.

Three or four applications of DDT to canning corn for control of second-generation corn borers left residues of 13 to 42 p.p.m. of DDT on the plants at ensiling time.

For control of first-generation corn borers single suspension sprays applied before the field corn was 69 inches high or two sprays applied a week apart before the corn was 59 inches high left residues of less than 1 p.p.m. of DDT on the plants at ensiling time. A single emulsion spray or two sprays applied a week apart left residues in excess of 1 p.p.m. of DDT, if the corn was sprayed after it was 44 inches high.★

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SOLUBLE FERTILIZERS

(*From Page 49*)

safety precautions must be observed in the storage and handling of nitrate sources.

Although published information is very sketchy on the foliar toxicity of individual nutrient sources, it appears that permissible concentrations of aqueous sprays may vary from 0.1 to 3.0%, depending on the chemical compound, the type and age of the plant, and the temperature during and following application. Formulations blended from several nutrient sources are usually safer than equivalent dosage from a single compound. The better all-purpose formulations can be applied at 0.5% concentration

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to most plants at moderate temperatures without danger of injury.

Selection of primary ingredients and methods of manufacture greatly affect dry flow of the product (both into and out of the package). Some ingredients cause hygroscopicity, caking, and deliquescence, which are troublesome properties in storage and use.

These difficulties can be avoided by the use of liquid formulations, but only at the expense of lower analysis and more expensive packaging, both of which contribute to higher freight per unit of nutrient.

Inclusion of trace elements in a general purpose formulation poses many problems. Use of low cost sulfate or chloride salts of the minerals leads to the formulation of insoluble phosphate compounds as soon as solutions are prepared. Whether trace elements in this form do more harm than good is a moot question. Although precipitation can be avoided by the use of sequestering agents, such as the sodium salt of ethylenediaminetetracetic acid, fifteen to thirty times the weight of the metals is usually required to prevent precipitation.

The cost of such ingredients is usually considered prohibitive. In most cases, it appears more practical to apply both secondary and trace elements to the soil or to the plant in separate operations if and when they are needed.

Registration and labelling of formulations which receive widespread distribution is very complicated, even if only primary elements from standard sources are incorporated in the product. If secondary and trace elements are included, it is virtually impossible to compound a single formulation and design one label which will comply with the regulations of all the states.

Although most of the above comments have referred primarily to the problems of home-garden formulations, much of the discussion is pertinent for commercial formulations. Many of the traditional objections to the applied cost of fertilizers in liquid form have recently been overcome,

notably in the case of nitrogen solutions. Rapid strides are being made by the fertilizer industry in the production and application of liquid formulations containing two and three primary nutrients at costs nearly competitive with conventional forms of solid mixed goods. The science and art of crop fertilization is moving forward dynamically, and we may confidently expect improved results at lower cost in the years ahead.★★

HOME GARDEN MARKET

(*From Page 46*)

"And it is an industry, despite a record of modest net profit for successful companies, and some badly burned fingers in other instances. In a seller's market during and even after World War II, the long pipeline to the consumer was filled pretty full, and through it materials moved briskly with the stimulus of great publicity on food production, as well as improved methods that really gave outstanding results in some cases. True, excess stocks were built up, obsolescence was high, and a lot of material had to be 'written off' whenever a buyer's market developed. But, barring the materials deemed hazardous by a fairly discriminating public, the new materials and new methods in crop production and protection, animal husbandry, and household pest control, all find their way into this market. People who never really differentiated between arsenate and arsenic are struggling just as successfully with the differences between o, o-dimethyldithiophosphate of diethyl mercaptosuccinate and hexachloro - epoxy - octahydrodimethanonaphthalene, and the industry can and should stand alone, no longer being 'small packages' of commercial products.

"A few merchandising principles that seem clear in other fields are still unclear in this market, but the firm convictions of the various exponents give promise of their thorough exploration and eventual definition. One is in packaging, where there still remains some doubt that the change from 'chemical manures' to 'plant foods,' or 'killing bugs' to 'protecting flowers' actually warrants the cost of attractive packaging. But dealers do display products they consider attractively packaged, and customers buy them, just as in the case of razor blades or grocery products. Good packaging is a continuing challenge to all producers but real progress is being made, with a significant number of products getting mention in packaging magazines and package manufacturer advertising.

"Another principle that is being more and more generally applied is that it costs money to have merchandise ready for the demand when it arises—and the products offered must come within certain limits of real value and certain limits of sales cost. Developmental work must carry a potential money-maker to where it is no 'gamble' for producer or consumer, or it won't pass through the channels between them. Consumer demand and actual utilization must be gener-

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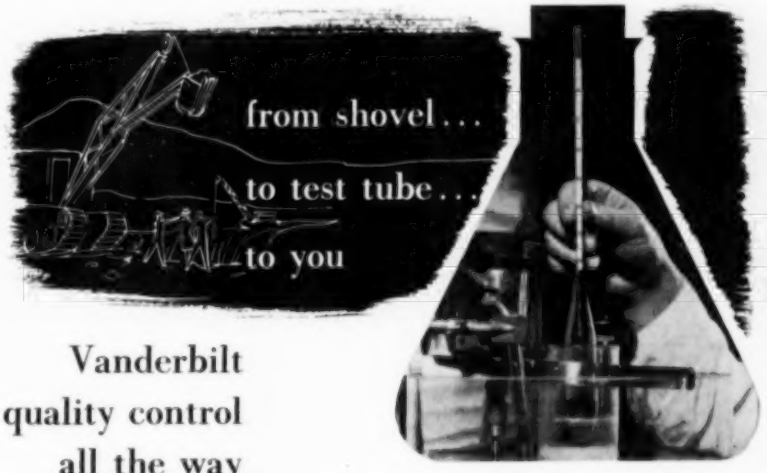
ated by the producers or some of the producers, and must guide production rate, for no price or profit will pay the rent on space used to display products that don't 'turn over.' Hence, the costs of merchandising products in this market, first and most accurately determined by service-wholesaler-sponsored surveys, have finally been pretty well acknowledged, identified, and provided for by prices and trade discounts. There remains a significant area yet largely unexplored, that of the cost and allocation of costs in merchandising materials that come to be well-known to the consuming public, in active demand. If the market continues to expand, and the public to understand and appreciate a *selected number* of the presently overlapping and over-diversified materials offered, there are in prospect progressive reductions in trade discounts and increases in advertising that will spark the movement through the pipeline in a way more like staple groceries move, smoothly and economically.

"Some of the developments of recent seasons that give promise of real volume in the years to come are the rapid progress of aerosol insecticides despite a 'luxury' cry in the beginning, the equally good progress of anticoagulant rodenticides where what we might call stronger measures had never been really widely used, and the general acceptance of selective weed and brush killers coincident with their expanding commercial use. These are versatile, understandable products—merchandisable. Conversely, our eagerness to offer all the different insecticides in a multiplicity of formulations, workable in a seller's market, has tended in a buyer's market to confuse the salesman and the customer all along the line. We hear criticism of the salespeople sometimes—but watch how smoothly they satisfy the customer who wants an aerosol, actually benefitting by predetermined standards of performance that make selling easier. The producer that supplies the home and garden market will do well to look ahead, try to see the customer at the other end of that long pipeline in years to come. The cost of getting established is so great that the 'dogs' shouldn't even be in the running, if we can detect their weaknesses in advance.

"The *where* part of every good news story is important in considering this market, and interesting too. The druggist used to be the center of activity years ago, and sometimes still is. The characteristically big working inventory of the hardware merchant makes that a logical outlet. The seed and garden supply store has the edge of trained salespeople in many cases. The 'chains' have done a real job with aerosols, and certain other products—mostly 'call items.' But the outstanding development seems to be organized distributor effort, upon which we can depend for efficient, economical, and above all else timely efforts to keep stocks in shape—for this is still a very seasonal business, and requires lots of timely service to dealers. More and more specialized service wholesalers are doing a fine job in their areas, and more and more spec-



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tial attention is being given to these products by all wholesalers.

"And in the suburbs, there are a host of outlets, some modest, some spectacular. A hundred thousand dealers, at least, offer products of this industry. They range from one at a subway kiosk in Manhattan to one that usually helps put the plants and packages in a Cadillac, from the drug-store in the St. Francis Hotel to my local filling station. With sound merchandising, the home and garden market will flourish, making an ever-more pleasant and beautiful environment, giving us all a better chance for success in home-making and relaxation."

A NUMBER of new pesticidal products for the home garden market based on malathion (made by American Cyanamid Co.) are making their appearance this season. This toxicant offers a number of advantages for the formulator of materials for home garden use. As indicated in our previous article on the subject (November, 1953, pgs. 38-43) the home gardener wants to be able to use one product, with compartive safety, to control a wide variety of garden pests. Malathion comes about the closest to filling this bill of any of the new insecticides which have been introduced in recent years.

On this all-important point of safety, malathion has a very good record. At levels of concentration required for effective insect control, it has proved unusually safe. R. G. Tousey of American Cyanamid Co., in an article in the Winter, 1953, issue of *American Cyanagrams*, house organ of American Cyanamid Co., reports that it has "a near perfect record." It has been used, he points out, "on hundreds of species and varieties of flowers and plants, both under glass and outside. It has been applied to scores of species of deciduous and evergreen trees. The only reported plant injury occurred in the greenhouse where some marginal burn took place on two species of fern."

According to this representative of the firm which manufactures the product, malathion is outstanding for protecting ornamental plants, shade trees and flowers against practically every insect which attacks them, giving it an unusually wide field of application. Unlike DDT, malathion is also effective against mites and aphids, so when it is used the gardener does not run into situations such as were

common following the introduction of DDT. It was found then that while DDT was quite effective against a wide range of common insect pests, its use created an unbalance in nature by destroying natural predators, with the result that mites and aphids which it failed to control thrived in alarming numbers, making the use of added miticides and aphicides practically a necessity along with DDT applications. Malathion, it is claimed, is a more balanced product from the angle of control, and may, at least until possible future complications develop, offer the home gardener the single effective material which he has long wanted for widespread use.

Another line of products missed in our first installment was the group of farm and orchard chemicals marketed by Woolfolk Chemical Works, Fort Valley, Ga. Woolfolk, one of the first companies to package an all-purpose insecticide-fungicide for a crop, has produced small packaged insecticides for distribution primarily in the southeastern states for more than twenty years. Their "Pan Peach Spray," referred to above, was placed on the market in 1932, and has sold ever since. It is offered in one pound packages, as well as in larger commercial size containers. The Woolfolk small package line numbers over 33 products in package sizes from one pound and one pint downward.

Woolfolk is one concern where, as noted in our previous article, management believes strongly in the necessity of educating the sales clerk. They emphasize that some little study on the part of the sales clerk is absolutely essential before he can have any intelligent basis for recommending specific home garden products for specific purposes. If he is going to be able to recommend the best product for the pest control job which his customer has in mind, he must of course have some knowledge of the whole range of garden pest control problems, the arsenal of chemicals that is available to combat them, and a general idea of how each product acts to do its job.

With this emphasis on the importance of dealer education, Woolfolk Chemical Works have brought out a 64-page catalog and handbook, "Protection for Farm and Orchard Crops," which is a model of the type dealer aid that should be employed more frequently in this field. Included are such practical details as photos and descriptions of important insect pests, recommended spraying schedules for various crops, dilution tables, compatibility charts, suggestions of rates of application, toxicity precautions, etc.★★

LISTENING POST

(*From Page 82A*)

eastern Kansas, and southeastern Nebraska.

European Corn Borer Hibernation Up in Some States

SURVEY information collected by State Agricultural Agencies and the U. S. D. A. in an attempt to determine the distribution and fall hibernation of the European corn borer has been compiled by the Section of Cereal and Forage Crop Insect Investigations. This pest is now known to be in 37 states. Wyoming was found infested for the first time

in 1953 when infestation was found in three counties of the State. Other states reporting additional counties infested for the first time were: Arkansas four counties, Colorado one, Kentucky six, Maine one, Michigan one, North Carolina 18, Ohio one, Oklahoma one, South Dakota two, and Virginia seventeen. This makes a total of 1,557 counties in the United States now known to be infested.

In 1948 the borer was taken in St. John the Baptist Parish, Louisiana. No specimens have been taken in the State since that date; consequently, Louisiana is not now listed as infested.

The 1953 European corn borer hibernation surveys were conducted after mid-September and therefore measured the fall population of borers. They were made in 26 States and included examinations in 726 counties.

The most severe infestations, over 300 borers per 100 plants, were largely confined to two areas. One comprised adjoining areas in southeastern South Dakota, northeastern Nebraska and northwestern Iowa. The other formed a band 1 to 2 counties wide across the State of Illinois from Burlington, Iowa, to Kankakee, Illinois. These two main areas were joined by a large number of Iowa and northern Illinois counties having averages of 101-103 borers per 100 plants.

In Eastern United States, as a whole, the average number of borers per 100 plants was practically the same in 1953 as in 1952. In four of the 13 States comprising the area, Delaware, Maryland, Rhode Island and Virginia, the average was higher in 1953 than in 1952. The increase in the number of borers in 1953 over 1952 for Delaware was 35 per cent, for Maryland 28 per cent, for Rhode Island 40 per cent and for Virginia 21 per cent. The heaviest infestations were in southern Delaware and adjoining counties in Maryland.

For the North Central States the average number of borers per 100 plants was higher in 1953 than in 1952. As in 1952, South Dakota (eastern half) was again the most heavily infested State in 1953, with an average of 258 borers per 100 plants, an increase of 24 per cent over 1952. Illinois had an increase in 1953 of 157 per cent over the 1952 infestation, Indiana 62, Iowa 79 and Nebraska 217. For the area as a whole, the infestation in 1953 increased 35 per cent over what it was in 1952.

The average number of borers per 100 plants for all comparable counties surveyed in the country increased 28 per cent in 1953 over 1952.

1953 Fall Boll Weevil Hibernation Counts Up in Georgia, Low in Tennessee

GEORGIA Agricultural Experiment Station at Experiment reports that fall examinations of surface trash from woods adjacent to old cotton fields, to determine the number of boll weevils entering hibernation, were made in three regions in Georgia from November 24 to December 31, 1953. The average for the State was at the rate of 1,984 live weevils per acre of surface trash. This compares with 1,346 weevils in 1952.

Weevils have increased at the rate of about 500 per acre for each of the last three years. The averages for the different areas where samples were taken were as follows: northwest (Gordon County) 3,049; north central (Spalding County) 1,500; and east central (Burke County) 1,404.

A total of five samples or 90 square feet were taken from each of 30 farms. Live weevils were found on 22 farms or 73 per cent of those examined. The maximum number of weevils per acre found on one farm was 15,488 in Gordon County. This is the highest individual count made during the last several years. At least one farm in each county showed over 5,000 weevils per acre.

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1953 fall hibernation counts in Madison Parish, Louisiana were considerably higher than those in 1952.

Fall hibernation counts made by Mr. A. P. Morris in McNairy County, Tennessee indicate that there will be few boll weevils in the cotton crop of that State during the early part of the 1954 growing season. Counts made on 100 samples from 20 fields showed an average of only 31.1 boll weevils per acre in hibernation, fewer than during the two previous years. The average for 1951 was 293.4 weevils per acre and 2,529.9 per acre in 1952. The very small size of the population found in hibernation last fall can be explained by the extremely dry weather that prevailed in the county from July until November 22. Because of this drought, there was very little secondary growth in the cotton fields after the regular growing period ended and, consequently, no squares of food for a large population to develop in, as happened the preceding fall. There were many weevils in the fields during picking. Adults could be found in dried-up bolls that were partly open, stunted, or aborted but that were still on the stalks. These, however, are believed to have starved as there was practically no suitable food in the fields for them.★★

SHADE TREE CONFERENCE

(*From Page 93*)

"To date," Dr. Decker concluded, "the record made by insecticides is not bad. Most deaths attributed to them have been accidental, and illnesses from their occasional use have been due to carelessness or to violation of ordinary precautions and good sense."

The most important current insect problem of trees in mid-America is definitely the increase of scale insects, E. F. Herrbach, entomologist with Standard Oil Co., Chicago, told the conference in his report on insect control developments.

"I do not want to appear as an alarmist," said Mr. Herrbach, "but right here in the greater Chicago area there is a very serious infestation of scurfy scale on young and medium size elm trees. This we have noted in surveys along the Lake Michigan shore from Gary, Ind., up into Wisconsin. They are also increasing from Detroit, Mich., out through Nebraska and into Colorado.

"The European elm scale is still with us in localized areas and the maple scale is building up in certain areas. The oyster, pine needle and some other scales seem to be behaving reasonably well, but we are hearing more about the Putnam scale, obscure scale and walnut scale, that formerly were not mentioned much."

Nature should not be left to take care of this scale problem, he said, but rather, the answer is a thorough spraying program. Continuing, he reported results of the use of sprays using 25 per cent DDT, 18 per cent white oil and 2 gallons dormant spray against scurfy scale and other species in the Chicagoland area.

In a panel discussion, the conference was brought up to date on Dutch elm disease and elm phloem necrosis. Dr. J. C. Carter, Illinois Natural History Survey, reported that phloem necrosis is subsiding in the southern tip of the state and that in 1953 there was little change in the situation at Rockford, Ill., farthest north point at which the disease exists in Illinois. At Urbana, Ill., in the center of the acutely afflicted area, the number of infected trees has increased from two in 1944 to 1,730 in 1953. Other infected areas extend from Columbus, O., through Indiana points to Shenandoah, Ia. The virus nature of the disease was established in 1938 and the elm leaf hopper has been identified as the carrier of this virus.

Dutch elm disease is spreading rapidly and may become the nation's most serious tree disease, Dr. Richard J. Campana, Illinois Natural History Survey, asserted. It has spread now from the New England

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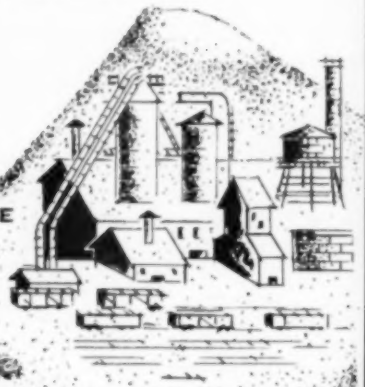

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states, southward to Virginia and Tennessee, westward to Missouri and has a foothold in Colorado, with its strongest incidence in Michigan, Ohio, Indiana and Illinois.

Dr. L. L. English, Illinois Natural History Survey, submitted figures indicating that Dutch elm disease appears and spreads rapidly following spray treatment with DDT for phloem necrosis. There is definite evidence, too, he said, of an association between use of DDT and the increasing infestations of Putnam scale.

Friday's concluding session of the Chicago conference featured another symposium on "Transmission of the Oak Wilt Disease." Participants were two Iowa State College representatives, Dr. W. H. Bragonier and Dr. H. M. Harris. Concluding the program, Joseph Antognini, Geigy Agricultural Chemicals, Burlington, Ia., talked on "Iron Sequestrene in Treatment of Trees and Shrubs."

St. Louis, Mo., was favored as the place for the 1955 meeting of the Midwest Chapter, but final decision was left for action by the executive committee. Attention was also directed to the 30th annual convention of the National Shade Tree Conference, to be held Aug. 30 through Sept. 3, at the Haddon Hall Hotel, Atlantic City, N.J.★★

SOIL CONFERENCE

(*From Page 95*)

Minnesota was the first state, Dr. Burson said, to have the fertilizer industry, local fertilizer, feed and seed dealers, elevators and creameries, serve as depots for collection of soil samples. The dealer, he explained, is supplied with soil sample containers, shipping cartons and instruction on taking samples. He passes this information on to his farmer customer and the latter, after taking samples from his fields, either sends them direct to the college laboratory or lets the dealer handle the shipping. A report of the test goes from the laboratory to both the farmer and the dealer and the farmer is advised to "Use the fertilizer grade your dealer has available."

To further bring the dealer into the program the county agent and the extension soils specialist hold meetings with fertilizer dealers to bring them the latest information on fertilizers and testing.

Why timing of the application of fertilizers is important was discussed by Dr. Edward H. Tyner of the Univ. of Illinois. He explained the "competition" which fertilizers face between the demands of the colloidal and microbial phases of the soil action on them and how this competition affects the availability of fertilizers under different conditions. Sometimes the amount of fertilizer to use is important, he said, and again the time of application or the presence of previous crop residues may affect results.

Reporting for the fertilizer industry on "Fertilizer Production Facilities," Paul T. Truitt, president of the American Plant Food Council, Inc., said tonnage has reached a new high for fourteen consecutive years. For this coming crop year another record is anticipated, by the expectation that about 11 per cent greater tonnage will be produced than was used last year.

The big problem, common to agronomists and manufacturers, he said, is how to get the experiment station recommendations fully and uniformly used by all farmers. He indicated that steps taken should be in the interest of more efficient farming.

Citing Dept. of Agriculture and Commerce figures, made available shortly before he took the platform, Mr. Truitt said that when present authorized construction of new facilities is completed, the fertilizer industry will have a value of $1,350,000,000.

There are in the U. S., its possessions and Canada, he stated, 935 fertilizer manufacturing companies who operate a total of 1,265 plants.

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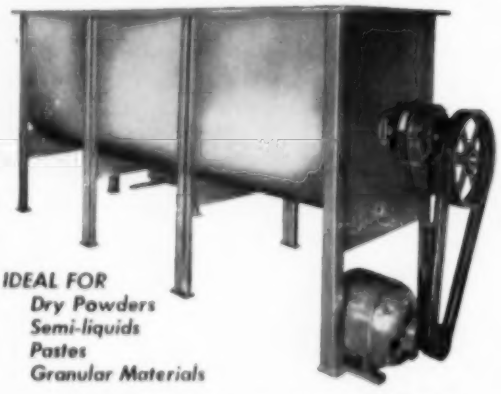

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He reviewed the expansion goals for nitrogen, phosphate and potash and declared that "for all practical purposes they can be considered as completed."

As to the long term future, Mr. Truitt predicted that "the fertilizer industry will continue to develop better and more modern plants, better end products, more efficient methods of distribution and have on hand the fertilizer farmers will use in years to come."

In a challenging discussion of "What Does The Future Offer For the Fertilizer Industry?" Dr. Harold E. Myers, associate director of the Kansas Agricultural Experiment Station, took issue with charges that increased use of fertilizer and lime contribute to the agricultural surplus problem. The continued use of fertilizers in the face of mounting crop surpluses, he declared, is justified by the need for economical production of high quality crops.

Research has accomplished much for the fertilizer industry, Dr. Myers said and can be expected to do still more. But the fertilizer industry, he asserted, should be expected to carry a large part of the research load in the future.

"It has an obligation," he said, "to see that an appreciable portion of its profits are put into research designed to improve the efficiency of its products as used by the farmers." The future, he continued, will present industry with a greatly enlarged opportunity to be of service to the farmers.

"As soil tests improve," he went on, "dealers and salesmen will be able to fill soil prescriptions as needed. The dealer should help the farmer understand his fertilizer problem much more thoroughly than he does at present. This means a more enlightened dealer and one who sells his product for what it is in relation to the farmer's need. The dealer renders a service by selling only those nutrients needed. To sell lime through a fertilizer bag to correct an acid residue in the soil resulting from fertilizer is an expensive way to apply lime. Furthermore, to add calcium sulfate to all soils, because some soils need sulfur is not rendering the high level of public service which should be expected of a responsible industry."

Closing the Chicago conference Prof. A. J. Ohlrogge of Purdue University presented the report of the state agronomists on suggested minimum fertilizer grade needs of the midwest for the year beginning July 1, 1954.

The agronomists decided this year not to make any "recommendations" as in the past, he explained, but offer them as "suggested" minimum grade needs. At the same time they wanted it understood that the production of higher grades of the suggested ratios is encouraged. In keeping with the trend to reduce the number of grades this year's list, Mr. Ohlrogge pointed out, contains ten fewer grades than last year. This, he said, was felt to be a step in the right direction toward more efficient use of plant foods.★★

CANADIAN ASSN. MEETS

(*From Page* 55)

Featured on the program was a panel discussion on "The Major Insect Control Problems in Canada." Speakers on this panel, all members of the Science Services, Canada Department of Agriculture, included: W. A. Ross, Division of Entomology; J. J. Fettes, Forest Biology Division; H. E. Gray, Stored Products Insect Unit; A. P. Arnason, Field Crop Insect Unit; G. G. Dustan, Fruit Insect Laboratory; and D. G. Peterson, entomologist.

N.A.C. CONVENTION

(*From page* 42)

Members of the program committee are: chairman, Howard Grady, California Spray Chemical Corp.; George Kreiger, Ethyl Corp.; John Rodda, U. S. Industrial Chemicals Co.; M. C. Van Horn, Florida Agricultural Supply Co.; and A. Petrus, Cotton States Chemical Co.

The arrangements committee for this meeting is as follows: chairman,

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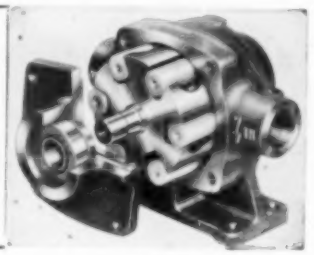

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about the editor —

Dr. Donald E. H. Frear, Editor of PESTICIDE HANDBOOK 1953, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition, he has written several other books, including "Chemistry of Insecticides, Fungicides, and Herbicides." Dr. Frear is Professor of Agricultural and Biological Chemistry at The Pennsylvania State College.

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A. Petrus, Cotton States Chemical Co.; Gus Garon, Shell Chemical Co.; Carl Goodwin, Monsanto Chemical Co.; William Hardy, Dow Chemical Co.; Ernest Holmes, Stauffer Chemical Co.; Jack Kennady, Diamond Alkali Co.; H. B. McClean, Mathieson Chemical Co.; P. J. Reno, Hercules Powder Co.; B. J. Smith, Chipman Chemical Co.; and Thomas Tennent, Ethyl Corp.

ALABAMA MEETING

(*From Page* 32)

spread of mimosa wilt, oak wilt, and little leaf disease of pines.

Between 1933 and 1953, mimosa wilt has spread from one North Carolina locality to 132 in 10 states including Alabama. Wilt-resistant clones were discovered, propagated, and released to nursery trade.

Oak wilt has been found in three western North Carolina counties, eight east Tennessee counties, fanning northward to include most of southwestern Pennsylvania and Ohio. Most of these states are pursuing vigorous control programs. Hepting discussed the use of the airplane in work conducted with oak wilt.

Littleleaf disease, which attacks mostly shortleaf, is severe in the northern half of Alabama. It is caused by a root fungus, attacking under conditions of poor subsoil drainage. Littleleaf sites can be determined from characteristics, and losses may be reduced by cutting diseased trees before they die, he concluded.

A motion picture, "Aerial Application" was presented by Raymond Griffin, Southland Dusting Service, Montgomery.

The day's program included three panel discussions on problems of aerial application, products that show promise in pest control, and evaluation of pesticides for farm use. The panels were moderated by George Wilson, Seminole Air Service, Foley; G. R. Williamson, Agricultural Sulfur and Chemical Co., Montgomery; and W. A. Ruffin, extension entomologist, Auburn.★★

DEALER PROGRAM

(*From Page* 82C)

are just some of the questions the dealer is expected to be in position to answer, and questions he must be able to answer intelligently, if pesticides are to be used efficiently, and if users are to get the degree of control which will sell them on repeat orders. This new booklet, to be distributed by the Inter-Association Council of Pesticide and Applicator Manufacturers, will provide some of the answers. It is now up to the industry to see that both booklet and poster get the widest possible distribution so they can make their maximum contribution toward making 1954 a bigger sales year for pesticides.

•

'Endothal' Adopted

Pennsylvania Salt Manufacturing Co. has relinquished its trade mark rights to the name "Endothal" in order that the term can be used as a simple designation for 3, 6-Endoxohexahydrophthalic Acid, it announced early this month.

Pennsalt has been using the name in connection with a class of its agricultural chemicals. These include a dessicant, a defoliant and a selective weed killer.

•

Weaver Appointed

P. J. Weaver has been named manager of the sales and development laboratories of B. F. Goodrich Chemical Co. in Avon Lake, O. In another personnel move W. E. Manring was named technical service manager of the plastic sales department, with headquarters in Cleveland.

•

Davison Names Marks

J. Sinclair Marks has been elected treasurer of Davison Chemical Corp. to succeed J. Early Hardesty, who recently resigned, the company announced early this month.

Marks, formerly assistant treasurer, has been with Davison since 1929.

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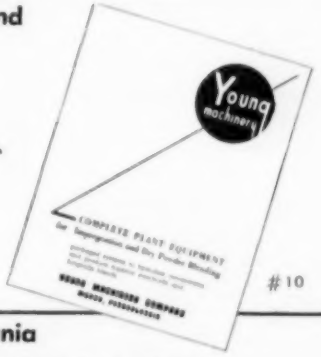

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Fertilizer Outlook Reviewed

THE "Future in Fertilizer Technology and Manufacture" was discussed by K. D. Jacob, USDA, Beltsville, Md., at the January 29th Maryland Fertilizer Conference, held at College Park, Md. Dr. Jacob indicated that "owing to population increases and, consequently, to the expanding need for food and fiber, together with our limited resources of additional land suitable for agricultural purposes, the trend in plant nutrient consumption is certain to continue markedly upward for an indefinite time. One may expect, however, he reported, "that at intervals the consumption curve will show periods of little or no increase, or even of depression, reflecting static or recession points in the national economy."

In outlining further the outlook for nutrient supplies, Dr. Jacob said that "for more than ten years the rapidly growing demand for fertilizers in the United States has generally exceeded the supply by a considerable margin. Major reasons for failure to meet the demand have included: (1) lack of sufficient manufacturing and processing facilities and the difficulty of expanding existing facilities under the war and postwar conditions, (2) necessity for shipping large quantities of plant nutrients to allies and to occupied countries, and (3) shortages of some chemicals essential for fertilizer manufacture.

"To correct this situation and as a step in the direction of affording more adequate quantities of plant nutrients for the Nation's increasing needs, the fertilizer industry, with the support and assistance of the government, has embarked on a program of expansion in fertilizer production capacity designed to provide for a total supply of 7,855,000 tons of primary nutrients by June 30, 1955, comprising 2,185,000 tons of N, 3,485,000 tons of available P_2O_5 and 2,185,000 tons of K_2O. The goals, which are well on the way to attainment represent percentage increases over the consumptions in the year ended June 30, 1951, as follows; N, 76.6; P_2O_5 65.4; K_2O, 58.4; and total primary nutrients, 66.2"

Dr. Jacob reviewed also the nitrogen, sulfur, and potash situations individually, and reminded his listeners that although the sulfur situation is not yet fully solved, progress has been such that the expectation of generally adequate supplies of elemental sulfur and of sulfuric acid for the near future appears to be justified. He pointed out that this expectation is based chiefly on development of new deposits, the installation of additional production facilities, and progress in use and recovery of spent and waste acids.

In connection with nitrogen supplies, Dr. Jacob reported "the present indications are that the future domestic consumption of fertilizer nitrogen will chiefly comprise increasingly large proportions of anhydrous ammonia and ammonium nitrate products, smaller proportions of urea products and ammonium phosphates and perhaps, decreasing proportions of ammonium sulfate and sodium nitrate."

"The current program for increasing the Nation's capacity for producing phosphate fertilizers includes a very large expansion in triple superphosphate" he reported, "and such smaller expansion in normal superphosphate, ammonium phosphates, and phosphoric acid, as well as a considerable capacity for nitrophosphate products, which heretofore have not been manufactured in this country."

Dr. Jacob stated that little change in the types and relative proportion of the potash fertilizer materials is in prospect, at least for the near future, and that the supply goal of two million tons of K_2O for 1954-1955 is nearing attainment.

He suggested that in general, applications of trace nutrients should be carefully fitted to the specific requirements of crops in relation to the soil and other conditions.

In considering the physical condition of mixed fertilizers, Dr. Jacob pointed out the increased interest in this problem, since the concentration of nutrients in fertilizers mixtures is increasing; and since the high nitrogen mixtures require the use of considerable quantities of ammonium nitrate or urea. He indicated that the granulation of the mixtures and their packing in moistureproof containers appears to offer the only satisfactory solution of this problem.

Breidenbach to New CSC Post

R. W. Breidenbach has been named assistant general manager of Commercial Solvents Corporation's agricultural chemicals sales department with headquarters at the company's general offices in New York City.

Until now Mr. Breidenbach has been directing the development of distribution for CSC's increased production volume of agricultural nitrogen resulting from new facilities completed in 1953 which doubled the company's output of anhydrous ammonia, "Dixsol" nitrogen solutions and solid ammonium nitrate fertilizer.

Mr. Breidenbach has been with Commercial Solvents since 1948 and came to its agricultural chemicals sales department from San Francisco where he was manager of the company's district office.

Big Increase in Pyrethrum Output

PLANS to triple the East African output of pyrethrum over the next five to ten years were told to AGRICULTURAL CHEMICALS by a representative of the Pyrethrum Board of Kenya in a recent interview. An eventual output of 15,000 tons of pyrethrum annually is the planned goal, according to Norman H. Hardy, executive officer of the board, who spent three weeks in the United States during February, visiting all the leading pyrethrum processors. This compares with approximately 4,500 tons of pyrethrum produced in British East Africa and the Belgian Congo in 1953.

Japan, an important producer of pyrethrum twenty years ago, was back in the world market on a growing scale in 1953, producing about 600 tons of exportable pyrethrum. Brazil produced about 250 tons also, but the entire output was used internally.

Part of the Kenya Pyrethrum Board's plan to recapture a larger share of the world market for household, industrial and agricultural insecticides is a program directed toward a long-range downward price trend. Realizing that high prices in the past have tended to reduce use of pyrethrum, the Board feels that lower prices can gradually reverse the trend, particularly in view of the "green light" which health authorities in all parts of the world have given pyrethrum insecticides for insect control in food processing and storage plants, in dairy barns, for truck and garden crops, and more lately in the disinfestation of ships.

Getting down to specific prices, both current and future, Mr. Hardy stated that they are aiming at a dependable and ample supply of pyrethrum at a figure of approximately 30c per pound within the next three to four years. The current market in Africa is 34½¢ to 35¢ lb. fob African ports.

Eventually the main bulk of exports of pyrethrum from Kenya, and probably also from the Belgian Congo, will be in the form of concentrated extracts. Kenya at present is gradually changing from an exporter of dried flowers to extract. The first large shipment of East Africa's pyrethrum extract to reach the United States came into New York last month, 33,000 lbs. of 25% extract.

Kenya extract at present is not fully acceptable on a quality basis, according to Mr. Hardy, but it is being improved through process changes. The Pyrethrum Board indicates that a higher quality product will be forthcoming shortly. Plans call for an expansion in extract plant facilities in Kenya. An extract plant will also be erected in the Belgian Congo in the near future. When wholly suitable extracts are available from the African plants, their distribution in world markets will be through the same existing outlets as for the present sale of pyrethrum flowers.

•

Fertilizer Safety Contest

The National Safety Council recently issued its bulletin on the safety contest in the Fertilizer Section. For the contest year January 1, 1953 to December 31, 1953 contestants working most man-hours in November, 1953 with perfect records were Baugh Chemical Co., Baltimore Md., Virginia-Carolina Chemical Corp., Charleston, S. C.; and Wilson & Toomer Fertilizer Co., Jacksonville Plant.

•

Fulton Opens New Office

A general sales office will be established in New Orleans in the near future for Fulton Bag and Cotton Mills. This office will be in addition to Fulton's new plant now under construction and will be under the direction of J. M. Elsas, executive vice president.

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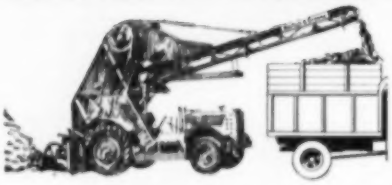

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Highway Appoints Terry

W. W. Kingman, sales manager for Highway Equipment Company, Inc. of Cedar Rapids, Iowa, announces the appointment of Philip Terry as new eastern district manager for the company with headquarters in Carlisle, Pa. Included in that territory are the states of Pennsylvania, Maryland, Delaware, Virginia, West Virginia, New York, New Jersey, Rhode Island, Connecticut, Vermont, Massachusetts, New Hampshire, Maine, and the District of Columbia, and Quebec, Eastern Ontario, and the Maritime Provinces in Canada. Highway Equipment Company, Inc. manufactures a complete line of spreaders and bulk delivery equipment.

•

CACA Convention

One of the highlights of the third annual meeting of the Colorada Agricultural Chemicals Association in Denver, Jan. 29, was the revision of recommendations for pest control.

More than 100 changes in recommendations were adopted as a result of an afternoon session of the CACA and the Colorado Agriculturals Chemicals Clearing Committee. Most of the changes, CACA reports, result from the proven effectiveness and commercial availability of several new chemicals.

Paul W. Swisher, permanent chairman of the Clearing Committee, presided over the joint session.

Reports were given on herbicides by Bruce J. Thornton, head of weed control for the extension service; on rodenticides by Roy Fugate of the U. S. Fish and Wildlife Service; on insecticides by Gordon T. Mickle, extension entomologist; on bean beetle experiments by John L. Hoerner, college entomologist; on proposed research for 1954 by L. B. Daniels of Colorado A & M and on regulatory phases by F. Herbert Gates, state entomologist.

The Colorado association elected Ralph W. Farr of Greeley and Orval J. Schall of Monte Vista as new directors, and named Walter D. Smith of the Denver Fire Clay Company as president, Farr as vice-president and Claire E. Titensor of Agricultural Processing Industries as secretary-treasurer for 1954. Titensor had previously served as president.

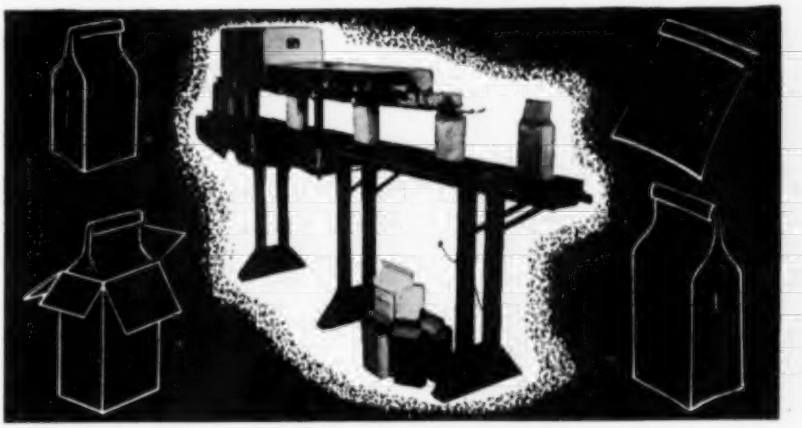
Retiring Directors were W. E. McCauley of Shell Chemical and Dr. B. Thomas Snipes of U. S. Industrial Chemicals. The 1954 Association committee chairmen are Fred Cherry of Rohm and Haas Co., fungicides, E. C. Stone of Denver, herbicides, Harold Mankoff of Manco Chemical Co., rodenticides, Howard Beaudoin of the Velsicol Corp., insecticides, Floyd Knauss of Thompson-Hayward, membership, Robert Reider of Shell Chemical, legal, and J. Newton Hall of Pioneer Chemical Associates, publicity.

•

C. L. Parsons, Chemist, Dies

Dr. Charles Lathrop Parsons, 86, noted chemist, educator and former government official, died recently in Pocasset, Mass. Dr. Parsons, who had been secretary of the American Chemical Society from 1907 to 1945, was chief chemist of the U.S. Bureau of Mines from 1916 to 1919, and on the Nitrate Commission during the first World War. Of major significance during that period was his work on nitrogen fixation.

FRY BAG SEALER



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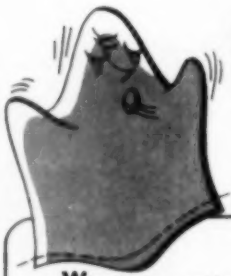

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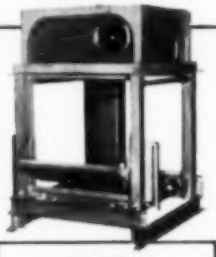

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New Stauffer Fertilizer

A new fertilizer, said to be superior to ammoniated super-phosphate, has been manufactured for farmers of the Pacific Northwest. Called Ammonium Phosphate-Sulphate, it is being made at Stauffer Chemical Co.'s new plant at Tacoma, Wash. and is being distributed by the Wilson & Geo. Meyer Co.

Stauffer says the fertilizer is superior to ammoniated super because it contains more nitrogen and does not suffer the reduction in water soluble phosphoric acid content which occurs when single superphosphate is ammoniated; approximately 90 per cent of the available phosphoric acid in the product being water soluble, the same ratio as in single super.

The company points out that by a new process it is possible to start with phosphate rock, sulfuric acid and ammonia and manufacture directly a product containing varying ratios of nitrogen to phosphorus. First production will be of a material containing eight per cent nitrogen and 12 per cent phosphorus pentoxide, but Stauffer says it will be possible to produce materials containing varying amounts of nitrogen and phosphorous pentoxide.

The new material saves weeks of curing time needed for ammoniated super, and handling is reduced. The new plant is located adjacent to Stauffer's superphosphate plant. The process was developed in Italy by Rumianca, and Stauffer has exclusive rights to it in the United States.

•

Conn. Fruit Growers Meet

Connecticut fruit growers were advised to grow more varieties and to give more attention to the processed fruit market at the annual mid-winter fruit meeting, February 17th, sponsored by the New Haven County Extension Service and the Connecticut Pomological Society. More than 150 growers attended the meeting, held at the Connecticut Agricultural Experiment Station, New Haven.

Some current trends in fruit production were discussed by Arthur C. Bobb, extension fruit specialist at the University of Connecticut. Significant changes in cultural practices which he listed included: mulch and trash cultivation, complete fertilization, supplemental irrigation, changes in pruning methods, and more mechanization.

The morning half of the fruit meeting was devoted to a discussion of cost versus efficiency in spray materials, led by Dr. Philip Garman, entomologist at the Station, and William Tunis, extension entomologist at The University of Connecticut. A panel of trade representatives participated.

Growers also heard a report on the 1954 apple spray schedule, prepared by the Connecticut Extension Service, from Mr. Tunis. Copies of the spray charts were distributed at the meeting.

FLOYD M. MIZELL

Mizell Forms Miko Chemical

Floyd M. Mizell has recently organized the Miko Chemical and Research Co., Glenshaw, Pa., of which he is president and general manager. The company will engage in the manufacture and formulation of specialty agricultural and household chemicals, private research on technical problems of agricultural chemistry and commercial pest and weed control.

Dr. Mizell is a graduate of Louisiana State University and Ohio State University. During his 16 years of experience in the field of economic entomology he served with the Louisiana Agricultural Experiment Station, the USDA, BEPQ, in private business with Rohm & Haas Co., John Powell Co. and most recently for the organic chemicals division, Diamond Alkali Co., Newark, N. J.

•

Stover Appointed

George H. Stover has been appointed treasurer-business manager by Oklahoma Fertilizer & Chemical Co., Oklahoma City, Okla. In another personnel move, Otto Clayton was promoted to the post of purchasing agent for the company.

•

To Represent Wyandotte

SCOTT STARKEY was appointed last month as Southwestern sales representative for Wyandotte Chemicals Corp., Michigan Alkali Division.

Starkey will represent Wyandotte in Texas, Oklahoma, Louisiana and Arkansas.

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1953

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The 1953 bound volume of **Agricultural Chemicals** will shortly be available from this office. The cloth bound edition sells for $14.75 ($15.50 foreign).

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Index to ADVERTISERS

Agricultural Chemicals, Inc. 108
American Agricultural Chemical Co. ..... Feb.
American Cyanamid Co. 30
American Potash & Chemical Corp. 58
Andrews, W. R. E. Sales, Inc. 107
Antara Chemical Div. General Dyestuff Corp. ..... Feb.
Arkell & Smiths 6
Armour & Co. ..... Feb.
Armour Fertilizer Works ..... Feb.
Ashcraft-Wilkinson Co. 115
Atlas Powder Co. 66
Attapulgus Minerals & Chemicals Corp. 4, 29

Baker, H. J. & Bro. 18
Bagpak Div., International Paper Co. 63
Barber-Greene 154
Baughman Mfg. Co. 94
Bemis Bro. Bag Co. ..... 3rd Cover
Berkshire Chemicals, Inc. 143
Bradley & Baker ..... Jan.

California Spray Chem. Co. 84
Chain Belt Co. ..... Feb.
Chase Bag Corp. 104
Chemical Construction Corp. ..... Feb.
Cohutta Talc Co. 160
Columbia Southern Chemical Corp. 14, 15
Combustion Engineering, Inc., Raymond Division 16
Continental Can Co., Betner Div. 122
Cox, Dr. Alvin J. 159

Davies Nitrate Co., Inc. 149
Davison Chemical Corp. ..... Feb.
Diamond Alkali Co. 28
Dorr Co. ..... Dec.
Duval Sulphur & Potash Co. 115
du Pont de Nemours & Co., E. I. 75

Eagle Picher Sales Co. 144
Eastman Chemical Products, Inc. 27
Edco Corp. 152
Edwards Laboratory 154
Emulsol Corp. ..... Feb.

Faesy & Besthoff, Inc. 154
Fischbein Co., Dave 150
Flag Sulphur & Chemical Co. 139
Floridin Co. 124
Fry Co., Geo. H. 155
Fulton Bag & Cotton Mills 72

Gallard Schlesinger Chemicides, Inc. 154
Geigy Co. 52
General Chemical Division, Allied Chemical & Dye Corp. 13
Glendon Pyrophyllite Co. 147
B. F. Goodrich Chemical Co. 67
Grace Chemical Co. 12
Greeff & Co., R. W. 158

Hammond Bag & Paper Co. 10
Harcord Mfg. Co., Inc. 100
Heckathorn & Co. ..... Feb.
Hercules Powder Co. ..... 4th Cover
Highway Equipment Co. 106
Hough Co., Frank G. ..... Feb.
Huber, J. M. Corp. 78
Hudson Pulp & Paper Corp. ..... Feb.
Hypro Engineering Inc. 150

International Clay Corp. 70
International Minerals & Chemical Corp. 17
Iowa Development Commission ..... Feb.

Jefferson Chemical Co. 64
Johns-Manville Co. 110
Johnson, C. S. Co. 136

KBH Corp. 120
Kolon Trading Co. 160
Koppers Co. 148
Kraft Bag Co. ..... Feb.

Lancaster, Allwine & Rommel ..... Feb.
Lessman Mfg. Co. 140
Lion Oil Co. 26
Lorenz Chemical Co. 157

Marietta Concrete Corp. ..... Jan.
Mathieson Chemical Corp. 76
McDonnell, Dr. C. C. 159
McLaughlin Gormley King Co. 158
Michigan Chemical Corp. 90
Mine Safety Appliances Co. 144
Mizell, Dr. Floyd M. 157
Monsanto Chemical Co. 24
Munson Mill Machinery Co. ..... Feb.

National Agricultural Chemicals Ass'n 132
National Aniline Div. Allied Chemical & Dye Corp. 21
Naugatuck Chemical Division, U. S. Rubber Co. 134
Neville Chemical Co. 121
Niagara Chemical Div., Food Machinery & Chemical Corp. 98
Ninol Laboratories, Inc. 19
Nitrogen Div. 130
Nopco Chemical Co. 138

Oldbury Electro Chemical Co. 156

Pacific Coast Borax Co. 20
Penick, S. B. & Co. 73
Pennsylvania Industrial Chemical Corp. ..... Dec.
Pennsylvania Salt Manufacturing Co. 77
Phelps Dodge Refining Corp. 133
Phillips Chemical Co. 22
Pioneer Chemical Associates, Inc. 109
Pittsburgh Coke & Chem. Co., Agricultural Chemical Div. 68
Potash Company of America 3
Poulsen Co. 123
Powell, John & Co. ..... 2nd Cover
Prentiss Drug & Chemical Co. 56
Private Brands, Inc. ..... Feb.

Raymond Division, Combustion Engineering, Inc. 16
Republic Steel Corp. 96
Riedeburg, Theodore Associates 157
Riverdale Chemical Co. 113
Robertson Co., H. H. 128
Rodgers Co., George G. 148
Rohm & Haas Co. 65

Shell Chemical Co. 8, 9
Southeastern Clay Co. 131
Southern Clays, Inc. 135
Southwest Potash Corp. 23
Spencer Chemical Co. ..... Feb.
Spraying Systems Co. 158
Standard Agricultural Chemicals, Inc. 80
Stauffer Chemical Co. 127
Sturtevant Mill Co. 92
Summit Mining Corp. 145

Tennessee Corp. 7, 129
Texas Gulf Sulphur Co. ..... Feb.
Thayer Scale & Engineering Corp. 156
Thompson, Friar M. 159
Tobacco By-Products & Chemical Corp. 82
Townsend, Dr. G. R. 157

Union Bag & Paper Corp. ..... Feb.
Union Special Machine Co. ..... Feb.
Union Standard & Equipment Co. 156
United Chemical Co. ..... Feb.
United Clay Mines 158
Universal Detergents, Inc. 11
U. S. Industrial Chemicals Co. 60, 156
U. S. Potash Co. 118
U. S. Steel Corp. 71
U. S. Phosphoric Products Div., Tennessee Corp. ..... Jan.

Vanderbilt Co., R. T. 141
Velsicol Corp. 74
Virginia-Carolina Chemical Corp. 82
Vulcan Steel Container Co. 137

Wallach Gracer Export Co. 146
Williams Patent Crusher & Pulverizer Co. 69
Willingham Little Stone Co. ..... Nov.
Willson Products, Inc. 153
Wisconsin Alumni Research Foundation ..... Feb.
Wolf's Agricultural Laboratories 157
Woodward & Dickerson, Inc. 146
Worthington Corp. 25
Woudhuysen, H. L. & Associates 140
Wyandotte Chemicals Corp. 126

Young Machinery Co. 151

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

Tale Ends

THE coffee shortage, it has been called to our attention, is one very prominent example of the disastrous effects of soil starvation. Our informant points out that Brazilian soils have been exhausted, and the coffee plantations moved progressively inland where land had not been farmed, but where temperatures were somewhat cooler. Last year the crop had been pushed so far south that low temperatures froze much of the crop, resulting in reduced output.

* * * * *

Prospecting for potassium in the North Sea Canal near Amsterdam is an active Dutch-Norwegian project at Ijmuiden. The process is said to have been proved in the laboratory and is now in the pilot plant stage.

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A real note of glamor was added to the bleak winter atmosphere last month by Hudson Pulp & Paper Corp. The bag company held a big press reception in New York's Governor Clinton Hotel for its newly-crowned Hudson Paper Queen of 1954, shapely Jacqueline Wise, of Kentucky, who is using her feminine charms for a worthy cause: stimulating contributions to the March of Dimes. Selected by Hudson in a nationwide contest, Miss Wise helped raise funds as official hostess at the 1954 March of Dimes Tobacco Auction.

* * * * *

The "Ford 1954 Almanac," "an annual review of practical, scientific and helpful information on farming, ranching, and country living," offers 208 pages, printed in four colors, with interesting color sketches and cartoons of the latest developments in all phases of agriculture. In a light, flippant style, the book reviews the ABC's on fertilizers, plant nutrients, soil conditioners, herbicides, farming practices, etc. It tells you how to dehorn cattle, wash eggs, and prepare tv snacks. It also lists the signs of the zodiac, a fishing calendar, and several party games.

* * * * *

Are you sometimes annoyed at late arrival of your copy of *Ag. Chem?* Blame it on the postal service. We go into the mails about the 10th of each month. . . . A Chicago magazine conducted a mail survey on its second-class publication, and found that copies mailed at the Stock Yards station took as long as 7 days to reach zone 15 in Chicago.

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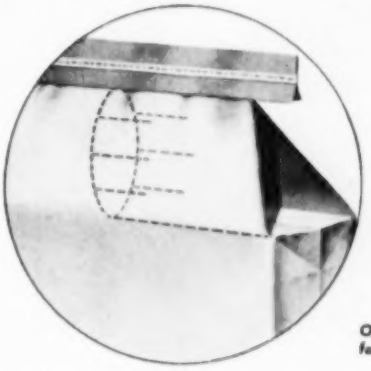

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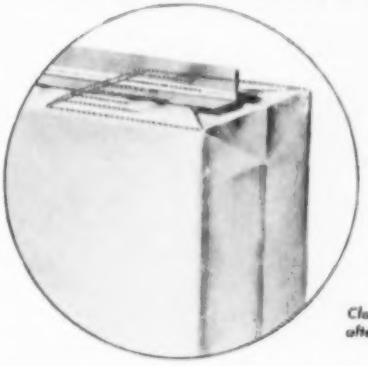

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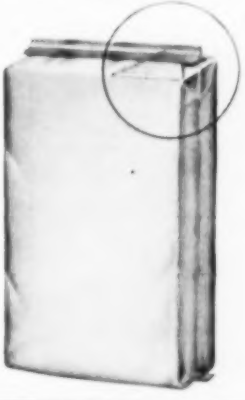

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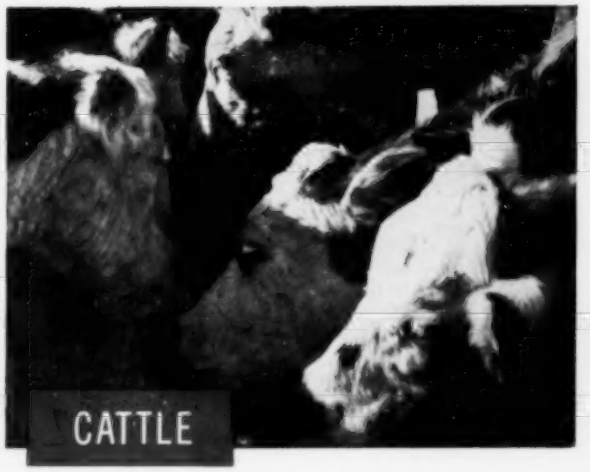

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